UNIVERSITY OF MINNESOTA
RECEIVED
DEC
3
1945
LIBRARY

TELEPHONY

November 24, 1945

THE JOURNAL OF THE TELEPHONE INDUSTRY

A SALUTE *to those who handled War's Vital Messages*

★ Here's to the men who handled war's v
messages, on land, on sea, in the air. They
served the best and they received it in the spl
did communication equipment which was s
plied by our government.

Stromberg-Carlson is proud to have had a p
in the building of much of this equipment.
more than three years, 'round-the-clock ope
tion by a tremendously augmented engineer
and factory force, made possible a steady fl
of these indispensable sinews of war.

Sound-Power Telephone in use at a Saipan Observation Post.

Advanced Marine Signal Unit in Pacific Theatre sets up Switchboards and Telephones.

Sealing Signal Corps Telephones in Stromberg-Carlson Factory to protect them against tropical moisture and humidity.

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Special Marine Corps Coast Guard Seabees Issue

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

H. D. FARGO, JR.
President & Adv. Manager

H. D. FARGO
Vice President & Treasurer

R. C. RENO
Vice President & Editor

A. J. STULTS
Secretary & Western Adv. Mgr.

JOHN G. REYNOLDS
Associate Editor

CLAIRE LE BRINT
News Editor

RAY BLAIN
Technical Editor

FRANCIS X. WELCH
Washington Editor

MAYME WORKMAN
Traffic Editor

★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★ ★

Published by
TELEPHONY PUBLISHING CORP.
Telephone Wabash 2435
608 So. Dearborn St., CHICAGO (5)
U. S. A.

Vol. 129, No. 21. Published every week on Saturday by TELEPHONY PUBLISHING CORPORATION, 608 South Dearborn St., Chicago (5), Ill. 50 cents per copy. Subscription $3.00 per year. Entered as second class matter September 4, 1908, at the Post Office at Chicago, Ill., under the act of March 3, 1879.

TELEPHONY

The Journal of the Telephone Industry

NOVEMBER 24, 1945

Contents

FOREWORD 19

COMMUNICATIONS IN "OLD" MARINE CORPS 23
By Capt. F. M. Steinhauser

COAST GUARD COMMUNICATIONS 28
By Sp 1/C Daniel Henkin

SEABEE SIDELIGHTS 30

INNOVATIONS IN FIELD WIRE CONSTRUCTION 33
By Capt. Ralph B. Jenkins

TELEPHONE LESSONS ON BOUGAINVILLE 36
By Capt. Ralph B. Jenkins

UNDERWATER WIRE COMMUNICATIONS 40
By Capt. George B. McManus

NATIVE TIMBER IN THE PACIFIC 42
By Capt. Ralph B. Jenkins

COMMUNICATIONS IN ACTION 44
By T/Sgt. Benjamin Goldberg

SIGNAL SUPPLY IN THE MARINE CORPS 52
By Lieut. Col. Allen B. Geiger

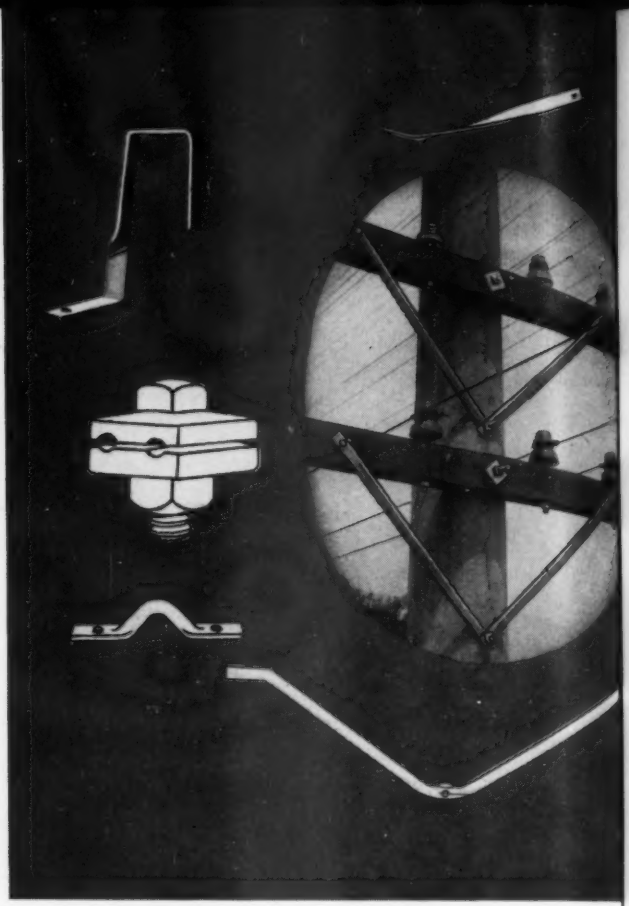
FIELD ARTILLERY AND COMMUNICATIONS 56
By Lieut. Col. Howard V. Hiett

THE MAHOGANY POLE LINE ON GUADALCANAL 60
By Lieut. Col. Harold B. Meek

RADIO AND TELEPHONE IN WARFARE 68
By T/Sgt. Benjamin Goldberg

COMBAT RECORDING 72

Fast, Easy Cutting is assured with Newman Cutting Tools. The Pole Tree Saw cuts limbs up to 8" diameter. The Curved Type Tree Saw cuts 2½" limbs with ease. And the Hand Pruner makes full ¾" cuts easily, and permits cutting close to the trunk line. Shipments can be made in two weeks or less on these products made by NEWMAN MFG. AND SALES CO.



Less Work for Linemen. Joslyn Pole Line Hardware is specifically designed utmost durability and is specially treated to resist weather extremes. T every JOSLYN MANUFACTURING & SUPPLY COMPANY item requ less maintenance attention. Strict manufacturing specifications go into e unit, and prompt service and delivery are assured. Always specify Jos

KELLOGG *Recommends and Guarantees These Finer Supplie*

. . . and that is your assurance that the line supply and construction materi shown here—all products of leading manufacturers—can be relied on dependable service and lasting satisfaction. Like all line supplies lis and described in the Kellogg catalog, they are backed by the famous Kell "double guarantee." This is your best assurance of getting materials t will perform properly over a long period of time. Send your orders to .

KELLOGG SWITCHBOARD & SUPPLY COMPAN

Factory and General Offices: 6650 South Cicero Avenue, Chicago 38, Illin
Branch Offices: Kansas City San Francisco St. Paul Los Angeles

Order Your Line Supplies from KELLOGG

Foreword

The editors of TELEPHONY take pleasure in presenting this issue which contains the story of telephonic communications in the war with Japan in the Pacific, as seen by the Marine Corps, the Coast Guard and the Naval Seabees.

The communications sections of these branches of the armed services were in the thick of battle in all the combat areas in the Pacific, laying communication lines which were so essential to the successful operation of our military forces. Communication men in the Marines, Coast Guard and Seabees, as well as in other branches of the service, have won universal commendation of military leaders for their faithful and efficient work on the Pacific front.

Inasmuch as the communications divisions included many employes of telephone operation and manufacturing companies, and, as much of the equipment they used in battle was supplied by our telephone manufacturers, we feel it is especially fitting that TELEPHONY, representing the telephone industry, pay tribute to the Marine, Coast Guard and Seabees signal divisions by presenting a history of some of their accomplishments in this special issue.

This story of communications in the war in the Pacific is embodied in several articles written by members of the three above mentioned services. All of their articles were written before the end of the war. The point of view expressed in many of them is looking toward a continuation of the war and, therefore, may appear somewhat out of focus today.

However, we feel that the story still is interesting and of enough importance to devote this entire issue to it. We believe that the termination of hostilities has strengthened the authors' points of view because the objectives they had in mind have been removed from the realm of desire into the realm of magnificent achievement. TELEPHONY believes its readers will agree.

Gen. Alexander A. Vandegrift

GENERAL VANDEGRIFT, 18th commandant of the Marine Corps, was born March 13, 1887, at Charlottesville, Va., and was appointed a second lieutenant in the corps January, 1909. He attained his present rank April 4, 1945.

As a second lieutenant on duty in Nicaragua, he participated in the capture of Coyotepe in October, 1912. April of 1914 saw him with the U. S. Occupation Forces at Vera Cruz, Mexico. In November, 1915, he was fighting hostile Cocos in Haiti. From 1916 to 1918, and again from 1919 to 1923, he served with the Gendarmerie d' Haiti.

After advanced study at Marine Corps schools, General Vandegrift was sent to Shanghai, China, as force operations and training officer.

He led marine forces ashore at Guadalcanal, Tulagi and Gavutu, August 7, 1942, thus opening the first American major offensive against the Japanese. By October 7, 1942, he had won the Navy Cross. The leathernecks who established the initial beachhead at Empress Augusta Bay, Bougainville, on November 1, 1943, were commanded by General Vandegrift. He became commandant January 1, 1944.

General Vandegrift wears the following decorations: Congressional Medal of Honor, Navy Cross, Presidential Unit Citation with one blue star, Expeditionary Medal with three bronze stars, Nicaraguan Campaign Medal, Mexican Service Medal, Haitian Campaign Medals (1915 and 1919-1920), Victory Medal with one bronze star, Pacific Campaign Medal with four bronze stars, two Haitian Medaille Militaire, Haitian Distinguished Service Medal and the Peruvian Air Medal First Class. The British Government has conferred on him the Order of the Bath.

Adm. Russel R. Waesche, USCG

ADMIRAL WAESCHE, commandant of the U. S. Coast Guard, was born on January 6, 1886, in Thurmont, Frederick County, Md. He received his early education in Maryland and, following a year at Purdue University, applied for entrance to the U. S. Coast Guard Academy. He was appointed a cadet on May 19, 1904, and received a commission as ensign on October 27, 1906.

His first nine years as an officer were spent aboard seven vessels. In February, 1915, he was transferred to Coast Guard Headquarters, Washington, D. C. Following 11 years as commanding officer on several vessels, in March, 1926, he was assigned to the Navy Yard in Philadelphia in connection with reconditioning and outfitting navy destroyers to be transferred to the Coast Guard. His next assignment was commander of Division 4 of the destroyer force, and from October 14, 1927, until February, 1928, he served as force gunnery officer on the staff of the commander of the destroyer force.

Returning to Coast Guard Headquarters following this assignment, he became ordnance officer and in December, 1931, he served for a temporary period as assistant commandant. In February, 1932, he became liaison officer in the War Plans Division, Office of the Chief of Naval Operations, Navy Department. Four months later he became aide to the commandant of the Coast Guard. He was appointed commandant of the Coast Guard with the rank of rear admiral on June 14, 1936. In 1940 and 1944 he was reappointed commandant. He was promoted to the rank of vice admiral in March, 1942, and to the rank of full admiral in April, 1945.

Col. James H. Hudnall, Jr.

Colonel Hudnall, signal officer at Headquarters Fleet Marine Force, Pacific, during the most active stages of World War II, was born near Roanoke, Va., on February 8, 1902.

He was appointed a second lieutenant on June 4, 1924, upon graduation from the United States Naval Academy. He was promoted to first lieutenant on April 16, 1930, and to the rank of captain August 22, 1935.

In July, 1926, he joined the provisional company of the USS Pecos, having sailed from San Francisco on June 2. In March, 1927, he joined the Third Marine Brigade at Shanghai, China, and returned to the United States in February, 1929.

Colonel Hudnall was promoted to major in June, 1940, and on May 8, 1942, was promoted to lieutenant colonel. He attained his present rank on March 1, 1944.

He was awarded the Bronze Star Medal and citation for meritorious achievement in action while serving as signal officer on the staff of the commanding general, Expeditionary Troops, Fleet Marine Force, Pacific, in the preparatory phase and during the operations on Saipan, Tinian and Guam islands from June 15 to August 12, 1944.

Colonel Hudnall now is stationed at the Marine Training & Replacement Command, San Diego, Calif.

Col. Nells H. Nelson

Colonel Nelson, signal officer of the First Amphibious Corps and later signal officer of the Third Corps during several major engagements in the Pacific, was commissioned a second lieutenant in the Marine Corps in June, 1926, when he was graduated from the U. S. Naval Academy.

He was stationed at various marine posts in the United States until 1927, when he joined the Third Marine Brigade in China.

In June, 1928, Colonel Nelson returned to the United States, but two years later was ordered to Nicaragua. In July, 1930, he once again returned to the United States and was assigned to the Army Signal School at Forth Monmouth, N. J.

Before the outbreak of World War II, Colonel Nelson saw further duty in China with the Fourth Marine Regiment and also was stationed in Haiti for a number of months.

In March, 1932, he was promoted to first lieutenant; advanced to the rank of captain in July, 1936; to major in April, 1941; to lieutenant colonel in August, 1942, and attained his present rank in July, 1944.

In June, 1943, he went overseas and remained there until July, 1945, when he was ordered to duty at Headquarters, Marine Corps. He now is stationed at the Navy Yard, Portsmouth, N. H.

Lieut. Col. Harry Vadnais

Colonel Vadnais, signal officer of the Fifth Amphibious Corps during the final stages of World War II in the Pacific, was commissioned a second lieutenant in May, 1934, when he was graduated from the U. S. Naval Academy.

He was stationed at numerous marine posts in the United States until April, 1935, when he joined the marine detachment aboard the USS Lexington. He remained with that unit until February, 1937, when he was ordered to the Signal Corps School at Fort Monmouth, N. J.

Colonel Vadnais was promoted to the rank of first lieutenant in March, 1937; to the rank of captain in June, 1940, and to the rank of major in May, 1942. He attained his present rank of lieutenant colonel in January, 1943.

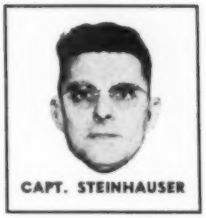
Officer Vadnais returned from overseas duty in August, 1945, and now is stationed at the Marine Training & Replacement Command in San Diego, Calif.

He earned a Letter of Commendation for his work as assistant communications officer during the planning phases of the Attu and Kiska operations. Later, he was presented the Bronze Star Medal for meritorious achievement on Iwo Jima Island, where he headed a Fifth Corps Signal Battalion.

COMMUNICATIONS IN "OLD" MARINE CORPS

By Capt. F. M. Steinhauser

A veteran of 17 years in the Marine Corps, Captain Steinhauser served as Radar & Communication Officer with the 10th Defense Battalion in the Solomons. At present, he is radio officer in the Electronics Section, Headquarters, Marine Corps.



CAPT. STEINHAUSER

MODERN WAR is nothing more nor less than the employment of staggering amounts of military personnel and materiel, all of which are coordinated through effective use of signal equipment. Present-day warfare would be impossible without the various agencies of communication. Hundreds of signalling devices, working 24 hours a day, carry steady streams of intelligence and transmit orders and information. That information enables commanding officers to formulate plans on the basis of which they issue orders. Those orders energize the troops.

The first object of an amphibious operation is to destroy the fixed defenses of the enemy, and air strikes to that end often occur months in advance. These generally are followed by naval bombardment which softens the target so as to permit troops—infantry, armor and artillery—to land comparatively easily. Once a beachhead is established, the enemy must be attacked vigorously and, if possible, exterminated. In order to continue the attack, air and naval support, together with coordinated use of all the power that armored units and field artillery can bring to bear, is essential.

Complementary movements which maintain a flow of supplies to the troops and accomplish the evacuation of the wounded are indispensable. In the meantime, aircraft and naval vessels range far and wide to harass the enemy, to soften him up further, to keep him off balance and, above all, to prevent him from bringing up reinforcements of either troops or materiel. Inch by inch our own troops advance in order to occupy more ground, which, in turn, permits them to advance farther. Finally, when the entire objective has been secured, it is organized as a defensive position from which the next large scale operation may be launched. All this, and more, is possible only by means of reliable, prompt and effective communication.

In ancient times the need for communication was just as great as it is today, and the crude means then available were employed just as unsparingly. Messages were dispatched by foot runners who often covered more than a 100 miles in a single day. Signals that made use of flames and smoke were much in style; so were the rays of the sun, reflected from a polished shield, and the display of banners colorfully held silent meaning. These were the ancestors of our present-day visual means of communication.

Communication by sound began with relayed shouts from man to man, with drum-beats and with trumpets; much later it progressed to the cadenced firing of cannon. Other old means of communication include the use of carrier pigeons and the development, in Napoleonic times, of the mechanical semaphore. None of these venerable signalling methods lacks its modern counterpart. With the discovery of practical applications of electrical energy, came the invention of the telegraph and with it, knowledge of the use of open wire for rapid, long-range transmission. Development of the telephone and insulated wire marks the latest stage of earth-bound communication. Radio took to the all-permeating ether.

Communication by wire received its baptism of fire during the Crimean War when, in 1854, the British used the telegraph to advantage. Wire telegraphy later found its way into the military establishments of all the world. It was used in our own Civil War, first by civilian personnel working with the armed forces, and later, at the birth of the Army's Signal Corps, by trained military specialists who were introduced because civilian operators couldn't be controlled well enough to meet military situations.

The maturing of the machine and electrical age in a martial world, with its rapid means of transportation, capable of handling huge quantities of troops and supplies, its rapid-firing weapons, its long-range artillery, with methods of obtaining accurate fire control, and its motor-driven vehicles, has brought about the employment of military forces beyond all previous possibility. Much of war's old-time glamor, however, has been lost, and dashing marshals no longer personally lead gallant charges because the battlefields on which their armies fight are much too wide to be dominated visibly by a single figure. Nevertheless, the high command still leads in fact as well as in name. Generals and their staff officers still control the situation because they know exactly what is going on. Their knowledge comes through all the complex channels of communication.

Freedom to develop private enterprise to meet the challenge of increasing public demands for higher standards, has helped American commercial communication agencies to lead the world. Telegraphy showed the way, the telephone followed in its steps. These two branches of the wire world now flourish side by side because they have become the very

● Telegraph field station of the Civil War period (1861-1865).

symbols of dependability. Military wire can be no less dependable. Unfortunately, commercial equipment, notwithstanding its excellent qualities, seldom fits a military setting; it is generally too bulky and too heavy for mass stowage or easy transportation. Above all, it isn't sturdy enough to absorb the rough-and-tumble shocks of war.

Commercial designers and manufacturers, nevertheless, have proved their mettle with distinction. Discarding all ideas of sales appeal, but without abandoning any of their basic principles of design, these artisans have, very largely, been responsible for the production of new models of all kinds of electrical equipment that live up magnificently to the best standards. At the same time they worthily meet the requirements of the armed forces. In many cases, development of military equipment has inspired designers to advance the art of telecommunications to new, undreamed of heights. The postwar world undoubtedly will benefit.

Prior to the first World War, military telecommunications had taken some forward strides from the first, uncertain telegraphy of the Civil War and the practically experimental telephone of the Spanish-American War in 1898. Between 1898 and 1914 the "wireless" came into being, and military men stirred uneasily—but did little. When, in 1917, America could no longer avoid coming to blows with the Germany of Kaiser Wilhelm II, so little had been done in the way of improvement to signalling methods that the war was nearly over before American arms caught up with communication's latest commercial developments.

The first World War produced few notable accomplishments with telephones. Radio then was the thing, and it came forward hand in hand with aviation. Since then that partnership has remained, its two members growing up together until radio and aviation now occupy the center of their respective stages, both in the military field and commercially.

Wire has advanced too, and its position today is stronger than ever. Even aviation uses vast quantities of it—on the ground. Military strategy and tactics have developed in direct relation to successive improvements in communication facilities. Wires themselves have developed so that nowadays troops carry with them several kinds, all of which not only resist extreme climatic conditions, but can be laid along the ground, can be used aerially or can be buried either under ground or under water. Most of these are twisted pair; all of them are strong enough, and their insulation is tough enough to stand the stresses of battle. Field wires are stranded; most of their electrical conductivity is found in a few strands of copper, while their mechanical strength is furnished by several strands of steel. Telephone instruments and switchboards have kept pace. There is much greater family resemblance, however, between the inside plant equipment used in 1918 and its forebears of 1898, than there is between the equipment used nowadays and that of the first World War. Whereas the military were formerly very conservative, they now demand more and more advanced electrical design.

The Marine Corps has, in comparison to the Army or Navy, always been a small organization. There have been times in the not so distant past when it was very small indeed. Marine corps budgets have been correspondingly small, and never have marines been allowed to establish their own developmental shops or laboratories. They have, therefore, always been dependent upon either the Army or the Navy for nearly all of their signal equipment. Their radio equipment is divided almost equally between the two, but the Navy has very little occasion to use wire other than for highly specialized shipboard installations which differ radically from those in the field. Consequently, marines have relied on the Signal Corps for almost all of their telephone and telegraph equipment. But there are a few exceptions. One of them is a series of light, submarine, armored, thermoplastic-insulated cables which was developed under navy specifications for use by the U. S. Coast Guard, but which the Marine Corps has adopted for use in inter-land installations. Another is the sound-powered telephone that both the Navy and the Marines use in artillery fire control. The Army uses sound-powered telephones for the same purpose but their design, though fundamentally the same, differs in detail. The Marine Corps, after all, is still a part of the Navy!

The period between 1919 and 1941 is the period known to present-day marines as that of the "old" Marine Corps, though there are many old-timers left who still remember the days of the Boxer Rebellion in China in 1901, and who possibly resent such an impious statement. To them the occupation of Vera Cruz, in Mexico, just prior to America's entry into the first World War, might well mark the end of an era in marine corps history with a better right to the title. The period of the first World War itself cannot compete because, in spite of their brilliant performance, marines then almost lost their identity for the reason that, as a body, they were attached to the Army by presidential decree.

Pre-World War I veterans to the contrary notwithstanding, therefore, the period of the "old" Marine Corps is now commonly understood to embrace the period between the great wars, that period between the end of the first American occupation of Germany and the odious beginning of the present war at Pearl Harbor.

During that period marines did a lot of fighting, although seldom was the public aware of the fact that their activities amounted to a series of minor wars. Men fight that kind of war—and get killed just as they do in big ones. The Marine Corps, indeed, is famous for its expeditions, interventions and occupations which, ever since 1775, when its history began, have been the chief means of maintaining its reputation as the service best prepared and best able to take care of any given situation. Between the great wars, marines were fighting in such places as Santo Domingo, Haiti, Cuba, Nicaragua and China. The story of the "old" Marine Corps involves those little wars.

That was when the Marine Corps was small and its budget meager; that was when a man had to stretch his wits to get even the barest essentials of equipment, and signal gear was very largely improvised out of anything that came to hand; that also was when every marine knew practically all there was to know about almost every other marine. Officers and enlisted men knew exactly what to expect of each other as individuals, and promotions for both were slow and came only by the hard way.

Telephone EE-8, that now famous instrument, was not in existence. The field telephones in use were, for the most part, relics of the type of design in use during the first World War. They were the EE-3, EE-4 and EE-5—all practical enough, but clumsy, heavy and inefficient. Switchboards were not nearly as up-to-date as those now in use. The BD-9 and BD-11 were small—too small for present-day use—but they were very satisfactory equipment then. The BD-14 was much bigger. All were signal corps designs. During the Second Nicaraguan Intervention (the first took place prior to the first World War) the marine brigade's administrative wire installations at Managua consisted of two BD-14 switchboards operated in parallel, and the telephones used were an assortment of commercial types, local battery and magneto, plus all the various military types. Internal communication at outposts in the field were similar, though there the little switchboards BD-9 and BD-11 came into play. In Haiti and China it was about the same.

That sounds rather cozy and informal, and so it would have been were it not for the fact that even these simple items were scarce and terribly hard to get. Deliveries were maddeningly slow. That was partly because of lack of funds, but was also the result of too great a burden being put on the shoulders of quartermaster personnel. In those days the quartermaster department of the Marine Corps was a jack-of-all-trades; it had no special sub-divisions, and the same men were supposed to be expert at handling and issuing every kind of article from squeegees to trucks, all at the same time. Fantastic results were common, but the custom did keep every man on his toes; it kept him busy making all sorts of jury rigs. Wire installations for use in remote control of radio transmitters, for instance, often sported home made relays whose contact mechanism was a telegraph key and whose electromagnetic operation was from a telephone ringer.

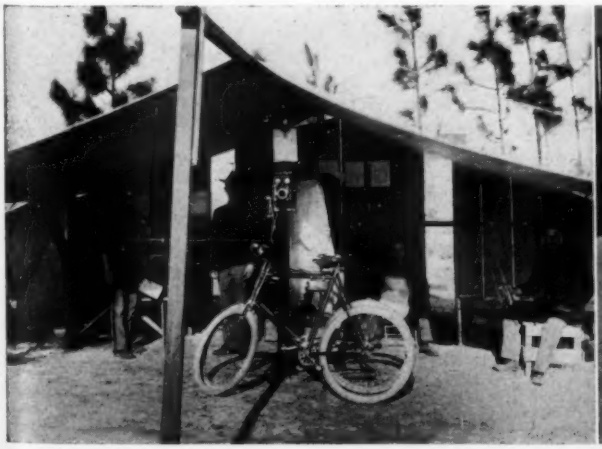
What sort of equipment had been ordered and what was finally delivered was by no means necessarily the same. If a 3½ in. voltmeter with a sensitivity of 1,000 ohms per volt was what was needed, it was quite possible that, after months of waiting, a huge crate would arrive, and in it would be a power-panel-size monstrosity of a meter that needed, just for its own operation, almost all the energy of the poor little power supply for which the original meter was ordered. And if somebody asked for a small resistor, he might get a delayed delivery of such a device as could safely have been connected across one of the major generators at Boulder Dam. The idea of miniature parts had not flowered, the trend, on the contrary, seeming to be toward, if not better, then certainly bigger parts.

That had its good points, though marines in the field may have been myopic in regard to them. The fact is that the taxpayer's money was saved by such procedure because most of this equipment was ferreted out by eager beavers at home, who acquired it at little or no cost to the government. Much of it was salvaged from obsolete ships, the idea, apparently, being that what had been good for the Navy must be all right for the marines. Tax-payers take notice.

Nearly all of the Marine Corps' actual operations in the field were thrust upon them on short notice. Very seldom did they have much opportunity to make special arrangements or to rehearse a specific undertaking. Thanks to the thorough knowledge all marines had of their fellow marines, it was generally possible to organize an expedition quickly with men who already had some field experience. That was done in 1933, for instance, when trouble suddenly broke out in Cuba.

Only the irreducible minimum of equipment was ever taken along, and even that was selected with an eye more to its portability than to its serviceability. The quartermaster kept on hand stocks of equipment that he had

• Telephone and telegraph station during the Spanish-American War (1898).



• Switchboard at Manila at the close of the Philippine Insurrection (1902).

stored away, often for years, against the arrival of just such an emergency. Yet there was no guarantee that any of this equipment could be furnished with spare parts, or even that it was complete and operable in itself.

Most of the signal equipment was old or rebuilt. Practically all of it had seen prior service. As an example, field wire was always retrieved after having been in use, and its damaged sections were repaired pending later re-issue. That is still the practice in the Marine Corps, but nowadays such second hand wire is used only for training purposes, communication having become too vital an element of war to be entrusted to doubtful equipment. Nowadays only new wire goes into battle, though what comes out still goes to the repair shops. Under the old system, obsolete or worn equipment went into battle over and over again.

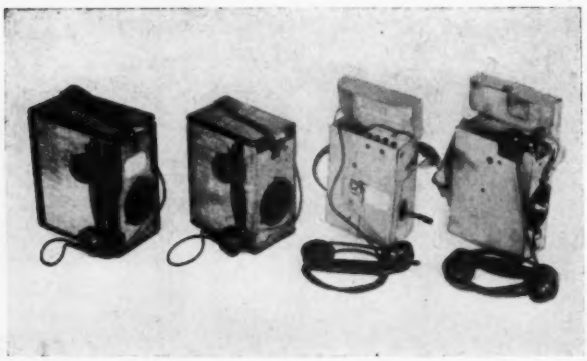
That, too, had its good points. It taught marines to make acceptable use of equipment that often was unsuited for the particular purpose to which it was applied; it taught them to rely on their own ingenuity for accomplishing the desired result. In short, it taught them to improvise successfully, and to proceed confidently under the impetus of only a jury rig.

Training manuals and other official publications cover all the aspects of practically every piece of signal equipment. In them are set down accurate tables of components of the particular equipment, and information as to how they work; they state precisely what to do and what not to do with the equipment, but invariably they assume that adequate provision for the installation, operation, maintenance and repair of that equipment has been made, and that sufficient spare parts and suitable tools are available. They are very carefully prepared, and are excellent guides when the situation is normal. They should be followed whenever possible, but they do not contemplate exceptional circumstances.

The Marine Corps, perhaps more than any other organization, has learned that in any war, large or small, it is axiomatic that no situation is normal. It was a matter of pride in the "old" Marine Corps that a signalman could, if necessary, conjure up almost any kind of instrument out of the odds and ends of material that he was able to scavenge. Complete power switchboards and even make-shift radio "trans-ceiver" sets were, at times almost literally pulled out of a hat. These creations were certainly not as efficient as is authorized equipment, but they do the trick, training manuals or no.

Fortunately, in the kind of small scale wars the Marine Corps was fighting, full efficiency of equipment was not essential. The enemy usually consisted of an untrained, revolutionary rabble that was poorly organized and ill-equipped, and whose loyalty to its own cause was at all times questionable. The purse strings of its leaders, with their promised or implied political and financial emoluments, were the principle means whereby these insurrectos were held together. When those strings parted, the insurrection usually collapsed. It was up to the marines to see that they did part, to make warfare too expensive for any private bankroll, and to do so at the least possible cost to themselves or to the American public.

• Telephones EE-3, EE-4 and EE-5 used by the "Old" Marine Corps, and present-day EE-8, shown left to right. EE-8 can be used with either local or common battery, but others were for local battery only.



• A camp telephone exchange during the intervention in Cuba (1906).

• Marines in Haiti (1928) with two switchboards connected in parallel by hair-like hook-up wires, and mounted on an early machine gun carriage trailer known as "coal cart." It was used in World War I.

During the period of the Second Nicaraguan Intervention, marine corps communications took a very long step forward with the designation of trained specialists as communication personnel. Formerly all signalmen had been classed simply as "general duty" troops, which meant that all marines were supposed to be able to handle communications, just as they are all expected to handle a rifle. With the correction of that fallacy, and with the formation of the Fleet Marine Force, which took place at about the same time, marine corps headquarters and, more especially, the office of the quartermaster general, began to study the subject of communication and its supply more closely.

The Fleet Marine Force was designed as a measure of self defense for the Marine Corps, which was then under threat of abolition because it was thought that its functions were in duplication of army functions. That was never the case because the Marine Corps' primary function has always been to effect landings in order to establish naval bases, a purpose wholly foreign to the Army. But that was a legacy which the Marine Corps inherited as a result of the presid-

ential decree which attached it to the Army during the first World War. The effect of the establishment of the Fleet Marine Force was to create, within the administrative framework of the Marine Corps, an operational organization that functions integrally with the fleet. As such, the Fleet Marine Force constitutes a naval unit in addition to the detachments of marines assigned to the larger categories of naval vessels. It is maintained in a state of constant preparedness for immediate action. That distinguishes it from any previous organization, either ashore or afloat, and forthwith the admonition, "Tell it to the Marines" took on new and added meaning.

To the Fleet Marine Force were assigned all kinds of marine corps units, among them some specially organized signal units whose rosters were largely made up of newly created communication personnel. All of these units participated in frequent maneuvers, many of which consisted of simulated amphibious landing attacks on isolated islands. This, of course, was directly prophetic of recurrent operations of the present war, as developed not only in the Pacific, but in the European and Mediterranean theaters of operation as well. For all of these recent operations, the early activities of the Fleet Marine Force were the original models.

Training measures were not always merely rehearsals; sometimes permanent installations were made. Apart from the Territory of Hawaii, the United States had a few small, scattered island possessions in the Pacific—Wake and Midway for instance. Their administrative and tactical wire installations were much alike, and were established by marine communication personnel as part of their training exercises. Small, barren slivers of land like these present peculiar difficulties. Because of lack of space, the routing of alternate lines accomplishes nothing; pole lines become prominent guide posts when seen from the air, and are easily put out of commission by shell or bomb splinters as they scatter across flat, open terrain; in such constricted areas buried lines are vulnerable to multiple breaks and are hard to repair. Nevertheless, wires were usually buried but in very short runs, interrupted by frequent terminal connections. That, of course, increased the over-all loop resistance and, at first glance, would appear to have made the lines even more vulnerable. On such small islands the lines were short and loop resistance hardly mattered. The easier repair of breaks by means of running hasty surface lines between terminals outweighed the disadvantages of added vulnerability. Damaged terminals are comparatively easily repaired. The Japanese attack on Midway demonstrated how difficult it is to maintain wire communication on a tiny island while under fire.

With the designation of communication personnel as specialists, came a stepped-up training program and the establishment of better schools. In general, there were two kinds of schools—elementary and advanced. The elementary schools were located at big training centers on the east and west coasts and gave very thorough instruction in all basic uses (as opposed to theories) of every kind of communication. Men were taught there to install and use wire, switchboards and teletypewriters, to handle radios, including code practice, to use the flag semaphore, smoke and other pyrotechnic signals, to handle simple coding devices and to maintain an orderly flow of traffic in message centers. There they also received instruction in how to make minor repairs to signal equipment in the field.

Advanced training was furnished by sending both officers and enlisted men to the Army's Signal Corps schools, to naval materiel schools and to special schools established expressly for the purpose by commercial institutions. There elaborate theory was taught and courses were given in special subjects, such as automatic telephone equipment or cable splicing. Repairs to signal gear requiring expert knowledge is done only by men who have had advanced training. Training under actual field conditions is required of all, and is carried on constantly in all tactical organizations both as formal instruction and in normal, line of duty activity.

Promotion has always been competitive in a sense, but when communication personnel became specialists their promotions became dependent upon examinations — practical, written and oral. These examinations were stiff; men had to study hard in order to pass them at all, and because promotions were rare, and competition correspondingly keen, a passing mark high enough to win reflected only the most conscientious kind of study. In addition to these examinations, promotions were dependent upon a man's demonstrated

• LEFT: Telephone switchboards in use in France in 1918. Note the captured German telephone on the table at left center. CENTER: Field artillery telephone, model 1910. RIGHT: A 1919 version of a modified "camp telephone" set for use by anti-aircraft artillery forces.

COAST GUARD COMMUNICATIONS

By Sp. 1/c Daniel Henkin, USCG

Specialist First Class Henkin covered the five invasions at Saipan, Anguar, Leyte, Luzon and Mindanao as coast guard correspondent. He formerly was reporter for the Army-Navy Journal for acting director of the Division of Public Information.

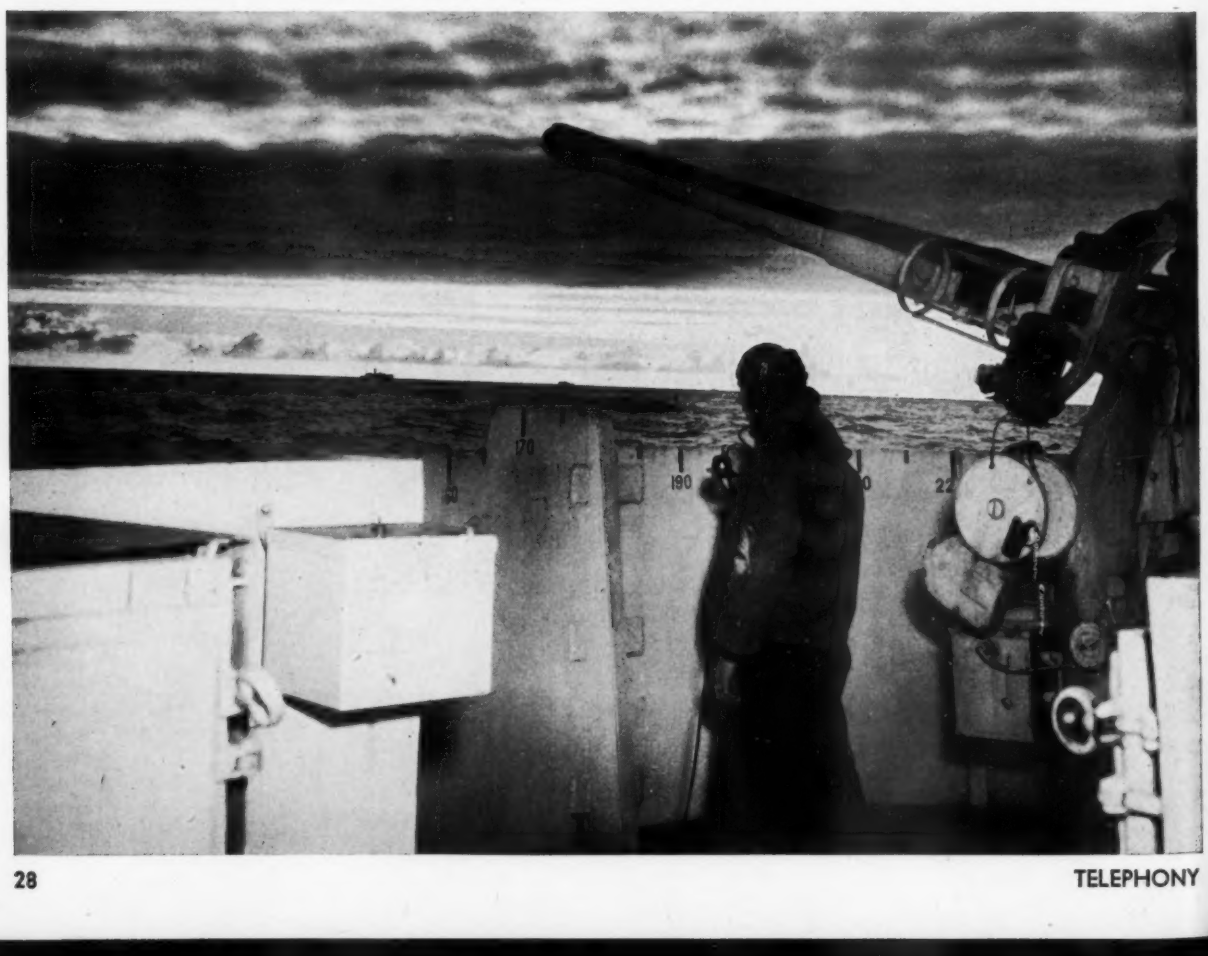
SP. 1/C HENKIN

WHILE more than half its men are at sea aboard attack transports, combat cutters, auxiliary invasion craft, and other ships of the amphibious fleet, the U. S. Coast Guard continues in its peacetime activities, remains responsible for insuring the safety of life at sea.

To this end, the Coast Guard's specially developed communications system has proved invaluable, and will likely be of strategic importance to the expanding air-sea-rescue operations now in the early processes of development.

Recent testimony before a House Appropriations Commit-

● Coast guard eyes and gun vigilantly look out to sea from the starboard beam of a coast guard cutter plowing through North Atlantic seas on convoy duty. The lookout, Coast Guardsman Ralph Greenberg of Chicago, Ill., is ready to notify the bridge officer of the slightest sign of any unusual activity.



• Coast guard radioman, aboard a cutter, converses by means of the radio-telephone. Coast Guard served in every phase of the global war.

• Receiving telephonic instructions from the bridge of a coast guard cutter, a coast guardsman gun-setter finds the range during battle drill.

tee disclosed that at present the Coast Guard maintains 30,433 circuit miles of telephone lines.

Meantime, it will be recalled that it was the alarm sounded by Coast Guardsman John C. Cullen, and flashed by telephone from his station at Amagansett, L. I., which first disclosed the landings of Nazi saboteurs on June 13, 1942. Summoned into action by that on-the-spot call, Federal Bureau of Investigation agents moved quickly to apprehend the Nazis and almost simultaneously to foil the landings of other enemy agents along the Florida coast.

Concurrently with the attempted landings, the Coast Guard, operating under Navy Department orders, was developing a beach patrol organization, whose duty it became to guard the long coastlines against similar landing efforts. Coast guardsmen were specially trained for the vigilant duty; horses and dogs were "enlisted" to assist them and to insure the successful operation of the patrol. Thousands of miles of telephone wires were installed.

Almost from the time of its creation in 1790, the Coast Guard has maintained coastal lookouts and patrols to guard against shipwreck emergencies and other marine disasters. Through the years, filled with a long record of dramatic rescues, the Coast Guard has depended in important measure on its network of telephone lines used to summon aid and administer the organization.

This network embraced several thousand miles of coast guard owned pole lines and cables which interconnected with the lines of the Bell System at numerous points. However, with the danger of saboteur landings imminent, these lookouts and patrols, together with the telephone lines which served them, were inadequate. They had been placed with strategic emphasis on the amount of shipping at a given point, or where shore hazards made marine disaster most common. But now the beach patrol had to include the entire coastal line, and it was a prime requisite that lines of communication must be greatly expanded. To isolated and remote sections of the coast line, to which no facilities had been pushed before, now it became immediately necessary to install rapid telephone service.

The problem of beach patrol communication was two-fold. The first was to provide an almost instant means of communication between the coast guardman on the beach and his local patrol station in order that he should be able to report instantly any "strange" occurrences in his area of patrol. The second was to provide suitable means of rapid communication between the local patrol stations and then from these stations to the various military control centers.

Conditions on the exposed beaches differed materially from those in more settled localities, and it was necessary to modify line and cable construction methods accordingly. A study of the problems involved determined that the best means of accomplishing the first phase would be to install a local telephone circuit along the beaches to be patrolled, with patrol posts equipped with commando jacks at closely spaced intervals. There the patrolman could plug in with a handset which he carried as part of his equipment.

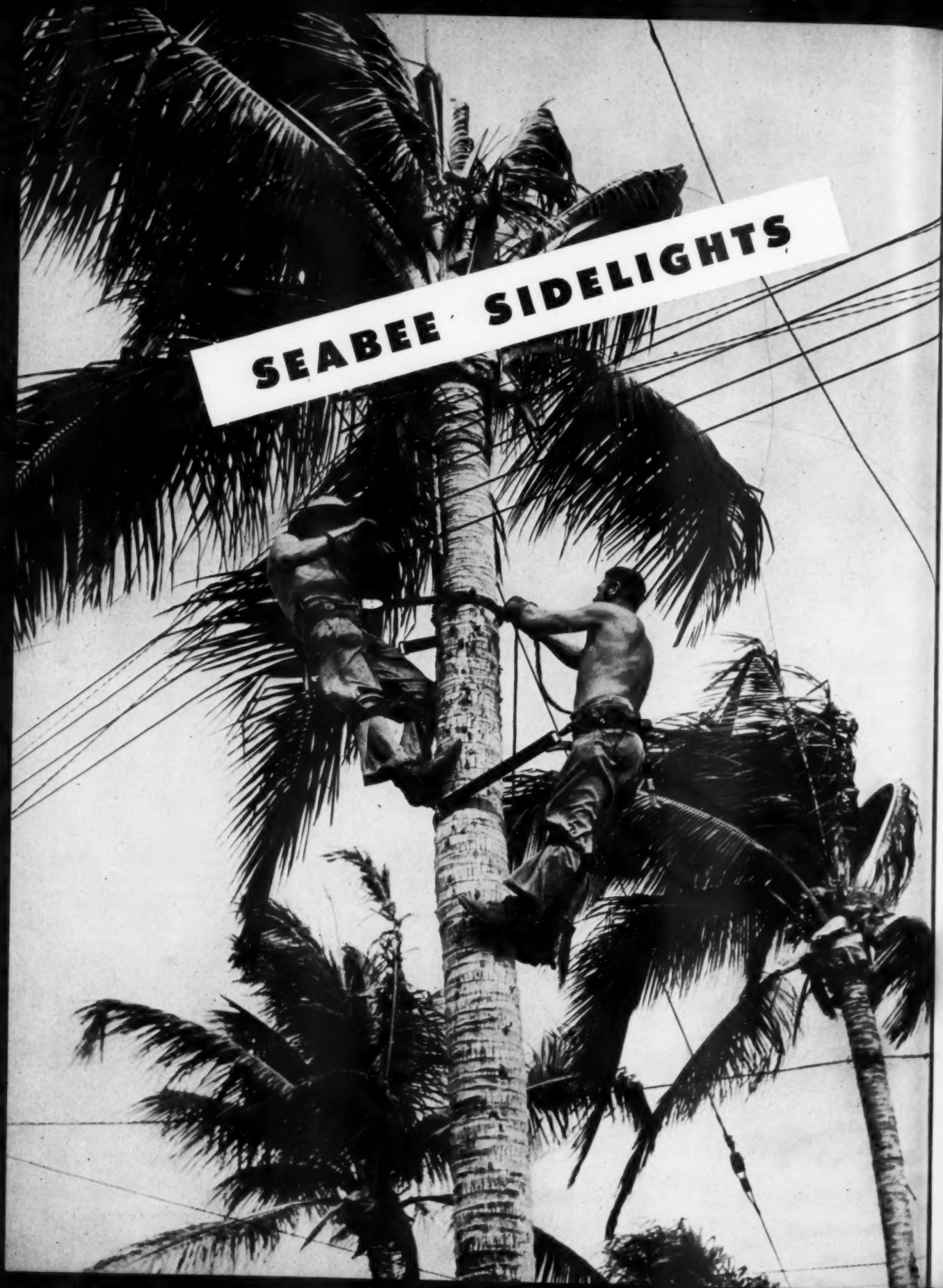
It was further decided that the most expeditious means of installing such circuits would be, contour of the terrain permitting, to plow in a small two conductor rubber insulated, rubber jacketed cable. The type chosen was the type "U" wire, which had been used previously for rural underground circuits.

Over 4,000 miles of this cable were ordered, together with special plows, tractors and splicing equipment. Within a few months large quantities of cable had been manufactured, installation was progressing rapidly, and already coast guardsmen were plugging in to make their regular beach-front reports.

What of the technical problems involved? While considerable quantities of type "U" wire had been installed commercially, conditions encountered on the rugged coastal lines were much different than those in the typical rural district. In most cases the initial installations were made parallel to and close to the beaches along the routes covered by the patrolman. This precluded his making long lateral jaunts to the patrol posts.

In certain locals, it was found that heavy storms fre-

(Please turn to page 75)


SEABEE SIDELIGHTS

FLEEING Germans, who camouflaged their telephone facilities to make them look like a cabbage patch and a restaurant, didn't do the job well enough to fool the members of a navy seabee mobile telephone unit at Le Havre, France.

After completing, in four days, installation of a four-position common battery switchboard to alleviate overtaxed telephone facilities in Cherbourg—a job expected to require at least three weeks—the nine-man unit moved into Le Havre.

The Germans had abandoned Le Havre in too great a hurry to wreck elaborate underground facilities. By the end of the first week, the Seabees had found seven vaults with all connecting cables intact. One was well concealed under a cabbage patch; another was disguised as a cafe-bar.

By the end of the third week, control lines from navy communications to transmitter and radio telephone were working over German cable. The Seabees also had found time to put in operation an audio amplifier unit from a mine detector with the oscillator tube removed. A pick up loop was then wound by using captured German magnet wire brought from Cherbourg.

Use of the equipment revealed more cable and vaults, many of which were put to use.

★ ★ ★

The Seabees, who apparently can find a use for anything, now are using Japanese railroad tracks as poles for power and telephone lines.

A seabee battalion on Tinian erected the poles, complete with crossarms cut from rails and steps made out of the straps that held the rails together. "Dead men" made from the ties, were used to hold the guys secure, and enough Jap insulators were found to carry the wire.

★ ★ ★

While installing a new underground electric power and telephone cable system at a Pacific base, the electricians of a seabee battalion found themselves in a tough spot. The trench in which they were laying the cables had to run between buildings on one side and a row of telephone poles on the other.

To complicate matters further, the backfill from the trench was piled in a manner which made it impossible to utilize the cable truck. It appeared that more than 600 ft. of heavy electric and telephone cable would have to be laid the "hard way"—by hand. But one civil engineer didn't like to do things the hard way.

He rigged up a sling with a piece of heavy pipe and some cable and had a small motorized crane pull alongside the row of poles. By using the sling, the crane could lift the heavy cable reels directly over the trench. When a pole was reached, the reels were detached, the crane backed out, moved in between the next two poles, picked up the reels and the work continued.

★ ★ ★

A seabee telephone lineman, John R. Garvin, electrician's mate, second class, USNR, of Aberdeen, Tex., was working in the vicinity of the Japanese lines when he saw an American pilot bail out of a falling plane over a South Pacific island.

Moving through the jungle toward the general area in which the flier had landed, the seabee and a few of his fellow linemen found the officer dangling in a huge tree, a perfect bull's eye for enemy snipers. The helpless pilot, severely bruised and with a badly broken arm, hung more than 80 ft. above the ground.

The tree in which he was caught was more than four feet

• Undeterred by a shortage of commercial insulators, Seabees at a Pacific base substituted empty Coca-Cola bottles.

• At a South Pacific island, Seabees set up office in this dugout while Marines completed the occupation of the island.

• Communications is most important, so one of the first jobs for the electricians is the erection of the telephone pole lines.

around—too large for the regular safety belt—so the seabee started the slow climb using an improvised rope sling. As the seabee started his slow ascent, hacking away at the heavy growth of tropical vines which limited his progress to inches at a time, his mates formed a security patrol to ward off snipers.

Working under the double hazard of being picked off by an enemy sharpshooter or accidentally severing his rope safety line as he cut through the creepers, the seabee lineman could climb only 20 ft. the first hour. Two and one-half hours passed before he could reach the injured flier.

As soon as he could untangle the parachute shrouds, the seabee hauled up water and morphine for the feverish man. Next he fastened a line to the wounded pilot and lowered him to the ground. Then he came down himself, more than three hours after he started his rescue attempt.

★ ★ ★

The Navy Seabee Fourth Special Battalion's Communication Office won't be forgotten very soon on Guadalcanal. Operating under the impressive title of "The Koli Point and Point Crus Division, Guadalcanal Telephone Co., subsidiary of the Solomon Islands Telephone Co.," the seabee office handled a total of 63,942 calls in six months.

All installations were made underground, including line drops. Some 57,000 ft. of wire were laid in the camp area. The only underground telephone system on Guadalcanal, the fourth special's exchange name was "Can Do."

★ ★ ★

"We're here to install your shore telephone, sir."

No wonder the admiral was surprised. His ship had docked at a North African port only minutes before. And here, among the first aboard, were two seabees, offering service that shaded many mainland ports.

The Seabees started with two switchboards (one Italian, the other borrowed from the Army), and had made their first temporary installations with wire salvaged from captured equipment.

Later their "Island X Telephone System" grew to include more than 100 permanent lines and well over 300 miles of wire. Seven switchboards were handling more than 1,600 calls a day.

In charge of installation was Chief Boatswain's Mate Fred Sinquefield, USNR, a telephone company employe before enlisting in the Seabees.

★ ★ ★

The Sixth Navy Seabee Battalion's "South Seas Light & Power Co.", which included two 135-horsepower generators, 20 miles of underground cable, five miles of overhead wires, and transformers, was a "gift" from the Japs, who lost more than face when the Marines and Seabees landed on Guadalcanal.

Even the repair truck, which proudly carried the name of the new utility corporation, was taken away from the enemy. It got hard usage in the jungle. In one day there were seven direct bomb hits on the cable line alone which necessitated 14 splices.

The captured power plant supplied electricity for lights, telephone systems, refrigeration lockers and other seabee projects on the island. Although the Seabees were grateful to the Japs for having brought in the electrical apparatus, there was one great difficulty after they took over the system.

"The Japs knew the exact location of all the equipment and power lines," said one seabee repairman, "and I don't think they ever missed!"

★ ★ ★

Three electrician's mates with a seabee battalion in the South Pacific were in the market for a remedy for graying hair after they were handed four lonely-looking dry cell batteries with the comment: "We need a PBX switchboard; this is the equipment available."

Their ingenuity put to the test, the seabee communication crew began "hunting bear." First catch was the keys for the board, borrowed from a salvaged ship, underwater so long its equipment had been given up as useless. Line drops came from a pile of junk remaining after an army conversion job. A discarded radio set provided a magneto; an ordinary

(Please turn to page 78)

● Navy seabee linemen at a central Pacific island base complete connections on their battalion telephone system's terminal box mounted on a stately palm tree. Partially buried quonset hut houses the unit's island communication office.

INNOVATIONS
in Field Wire Construction

By Capt. Ralph. B. Jenkins

Captain Jenkins, until recently stationed in the Electronics Section, Division of Plans & Policies, Headquarters, U. S. Marine Corps, served as a company commander in the First Corps Signal Battalion in the Southwest Pacific. He spent seven years in South America as a communications engineer before he entered the service in January, 1943.

CAPT. JENKINS

TO A TELEPHONE lineman the problem of putting up pole lines and stringing wire across a peaceful countryside is purely professional. That lineman, however, is confronted with no worse enemies than climate and terrain. What if he had to set his poles between mortar bursts and string his wires through machine gun fire? What if, up on the pole, he were the target not only for a driving blizzard or a hot sun, but for a number of snipers too? How "professional" would he feel about his job? Or would he scram?

Probably he wouldn't scram—not permanently anyway. But he'd come back to finish his work armed to the teeth, with as big a "posse" as he could muster and equipped with some gadgets, the like of which no telephone company ever included in its list of tools. That's what Marine Corps linemen did, only they had to stay on the job, posse or no posse, and get their gadgets later.

Until lately, military wire lines were handled in much the same way as are commercial lines. Open wire and aerial cable is used freely in rear areas and involves nothing unusual, but the bulk of forward wire communication is carried on insulated conductors—twisted pair. These insulated wires often are left lying on the ground, or at best, are elevated on trees or poles later, and tied in place by several ingenious means. Those means, however, didn't seem good enough after the campaigns of the Solomon Islands, after Tarawa in the Gilberts and after Kwajalein Atoll in the Marshalls.

Many an ex-professional lineman, who had given up his job to fight Japs, also became an ex(tinct)-marine. And many a vital message was delayed because of his death, thereby endangering the lives of many more marines. Great credit is due these erstwhile employes of a nationwide roster of commercial telephone companies, large and small, for great is their courage and devotion to duty. But neither credit nor courage necessarily saves lives, and dead men do no work.

The old remedy was to give linemen armed protection. It's still the best; but high on the gaunt trunk of a palm, the

●Marines on Bougainville use palm trees for telephone poles. Two marines stand guard ready for Jap snipers. Lineman reaches for wire spliced by groundman who uses steel helmet as a tool box.

● Marine communicators on Saipan have their woes. Passing vehicles tear down lines and the trouble shooters have difficulty unravelling the tangles.

● Marine communications crewmen tape breaks in trunk line near Saipan front. Lines, strung along the ground, were chewed up by passing vehicles.

lineman is as clear a target as ever. The first effective new measure involves the Seabees, themselves an innovation. With their help, roads were pushed in short order where most prewar engineers would have said no road could be. With roads come vehicles, and with a signal truck to help them, wire teams perform their hazardous duties faster, easier and more safely. But all other vehicles are hazards, and even the Seabees, with their bulldozers, occasionally mow down trees that carry important circuits. In the front lines, however, things move too fast even for the Seabees, yet communications must reach the foremost troops. In the front lines too, strange as it seems when all the din of battle is considered, the sound of a wire reel at work is dangerously distinct; invariably it draws fire. Furthermore, the wires it pays out are necessarily along the ground, where tanks and tractors, unable to see them, cut them neatly into short lengths faster than wire teams can lay them. That's bad for morale and communications; it's like being fired on by your own troops from the rear, and it promotes mayhem, if not murder in the communicators' hearts.

There are some new ways to lay wire that the marines are trying out. Some of these are patterned on the manner that the U. S. Forestry Service strings its lines. That is, the wire seldom is tied in, but lies loosely in supports that are attached to trees or poles, and is free to run in either direction if something falls on it. That saves many a broken line. Unlike the open, forestry service lines, however, the insulated field wires used need no further insulation, and their supports can be metal hooks into which the line is lifted without climbing, or lowered from the ground for inspection and repair by means of a pike or just a forked stick. A man, however, still must climb up to drive the hooks. This method has been only recently tried out on a limited scale. No reports are available on its success, but it's a try at getting wire off the tractor-infested ground rapidly without exposing the lineman to additional danger.

Another scheme, still in the experimental stage, is a modification of the method just described. The lines are

● To the front. Marines turn to aiding in the transportation of communications personnel equipment and gear for their messages to the front lines on Bougainville Island.

strung in the same way, but the hooks are driven by means of a special hammer which is on the end of a long shaft, and which is operated from the ground. With these hammers, lines may be elevated out of harm's way without sending a man aloft.

Both of these methods of construction are intended for use not only with the old-fashioned reels, but with a new type of wire dispenser that does not rotate. The idea for this type of dispenser didn't originate with the marines, but the marines claim the distinction of being the first to put it to actual combat use. Both on Iwo Jima and again at Okinawa the Marine Corps version of these dispensers was tried out. Briefly, their pay-out principle is like that of a ball of twine, but unfortunately the technical details of how they are put together and how they work cannot yet be told—the Jap is far too clever an imitator.

With one of these coils on his back, a man can pay out wire silently and have both his hands free for his weapons. He also can attach a telephone to the end of his wire and maintain constant communication to the rear over the very line he's laying. In addition, two or more of these coils may be spliced together and placed in a rack or other container so that they will pay out continuously and in sequence. In this way, wire may be laid from vehicles at far greater speeds than formerly was possible with reel equipment. Futhermore, the "vehicle" may be an airplane, or it may take the form of a bazooka projectile.

With these innovations, the marine telephone lineman can be as "professional" as he was before Pearl Harbor, and he's a more efficient marine. With gadgets like these, telephone communications are in step with the parade of developments that is annihilating Japan.

● A marine communicator and his small, improvised switchboard in volcanic sands of Iwo Jima. The "terminal pole" is a broken rifle and the operator's seat is a small, empty wire reel.

● Marine strings wire in the top of a tree near the beach on Saipan. He makes as fine a silhouetted target for Jap sniper as he does for the camera.

TELELEPHONE LESSONS ON BOUGAINVILLE

By Capt. Ralph B. Jenkins

MEASURED by the increasing tempo of war, the initial landing on Bougainville on the first of November, 1943 was a very long time ago. Actually, only two years have passed. But what years they've been! So much has happened and so many new developments in equipment and methods have come about since the marines hit the beaches on Empress Augusta Bay that an account of the use of telephones on Bougainville may seem out of place at this time. That landing and the winning of the perimeter beach head, focussed on Torokina Point with its airstrip, however, was the prototype for dozens of subsequent operations in the Pacific.

The first week of the Bougainville operation was one of blood and mud. Practically all communication was carried on by radio. There were no roads. But the enemy had been caught off balance, having expected a landing much farther down the coast. As a result he threw in troops wherever he could, and the ensuing battles were rip-roaring free-for-alls through some of the worst jungles in the world, where men and equipment were swallowed up in darkness and bogged down in the bottomless vegetable and volcanic debris of centuries. Ten yards was often the maximum range of sight.

In that sort of country, communications were haphazard to say the least. Radios were seriously blanketed by the density, depth and dampness of the jungle; wire lines were difficult to lay and impossible to repair. Runners had to stick to some trail that a tank had butted and blasted its way through—a twisting path through mud and snipers. On such a trail no wire had a chance.

During that first week the marines established a firm landing, with a solid perimeter defense. They took Torokina Point and its adjacent beaches, and they took the two little islands off shore, the larger one of which became the main supply dump—Puruata Island.

The smaller one, Torokina Island, lies between Puruata and the mainland. It was the scene of some of the bitterest, small scale fighting on record. Torokina Island is so small as to be useless for anything but a single anti-aircraft outpost, and so close to the new airstrip, near the Point, as to have no value as such. Later on, however, it came in handy as a cable station.

During the second week things settled down a bit, and some recognizably organized wire communications were installed. During this period, however, the Japs succeeded in getting a fairly large force to the far side of the marine-held area, and made an attempt at the well-known pincer type of attack. It failed miserably, but it produced some anxious moments and considerable confusion, especially in communications. Where signal orientation had been in two forward directions (roughly east and north), it now also had to face west. Southward was toward the sea, and, therefore, to the rear; communication in that direction was necessarily by visual means or by radio. In all other directions radio and wire were used.

There were still no roads, all available engineering personnel being fully occupied at the airstrip. All vehicular traffic was along the beach. So were most of the wire lines.

Fortunately, the location of the supply dump on Puruata Island relieved the beach of some congestion, but navy and coast guard landing craft still had to relay supplies from Puruata, and the beach, therefore, was still a turmoil of traffic.

It was toward the end of the second week that the Japs caught on to what use was being made of Puruata. During

• Marines moving to front on Bougainville demonstrate fancy footwork.

• The marines on Bougainville say that the seabees are efficient.

● Fuel dump fire on Puruata Island. Leathernecks roll out unexploded drums of fuel from within 30 feet of the holocaust. Wet down by hose, thousands of drums were saved in spite of the intense heat. The fire was caused by Jap bombs during the Bougainville operation.

this week, too, additional engineering troops were brought in, and work on several much-needed roads was begun.

Seabees came in on D-day. More came in later. By D plus 15 they had part of the airstrip usable for grasshopper planes, and had made a good start on both ends of the road around the landward sides of the perimeter, as well as on several local roads leading inland from the beach. It was only then that wire communications came in strong.

The very first thing that had to be done was to put in a cable to Puruata. During the early stages of the invasion of Bougainville, there were several abortive attempts to put in a rubber covered cable. At the Puruata end, the landing was fairly simple, owing to some protective coral reefs that held off the surf and at the same time prevented boats from using that part of the shoreline. On the mainland of the big island of Bougainville, however, there was nothing but the enemy to prevents boats from landing where they pleased, except at the tip of Torokina Point, where there is a wide coral shelf, covered by shallow water. All manner of vehicles wallowed up and down the entire length of the beach, including that part around the Point. To effect a cable landing on the Bougainville shore was, therefore, something of a problem.

The first rubber covered cable was buried in the beach—and was cut up promptly by tractors, chewing deep into the soft sand. Then it was moved, and the armada of small craft, buzzing between the islands, churned it around in their wash. When it was recovered it looked like a dish of spaghetti.

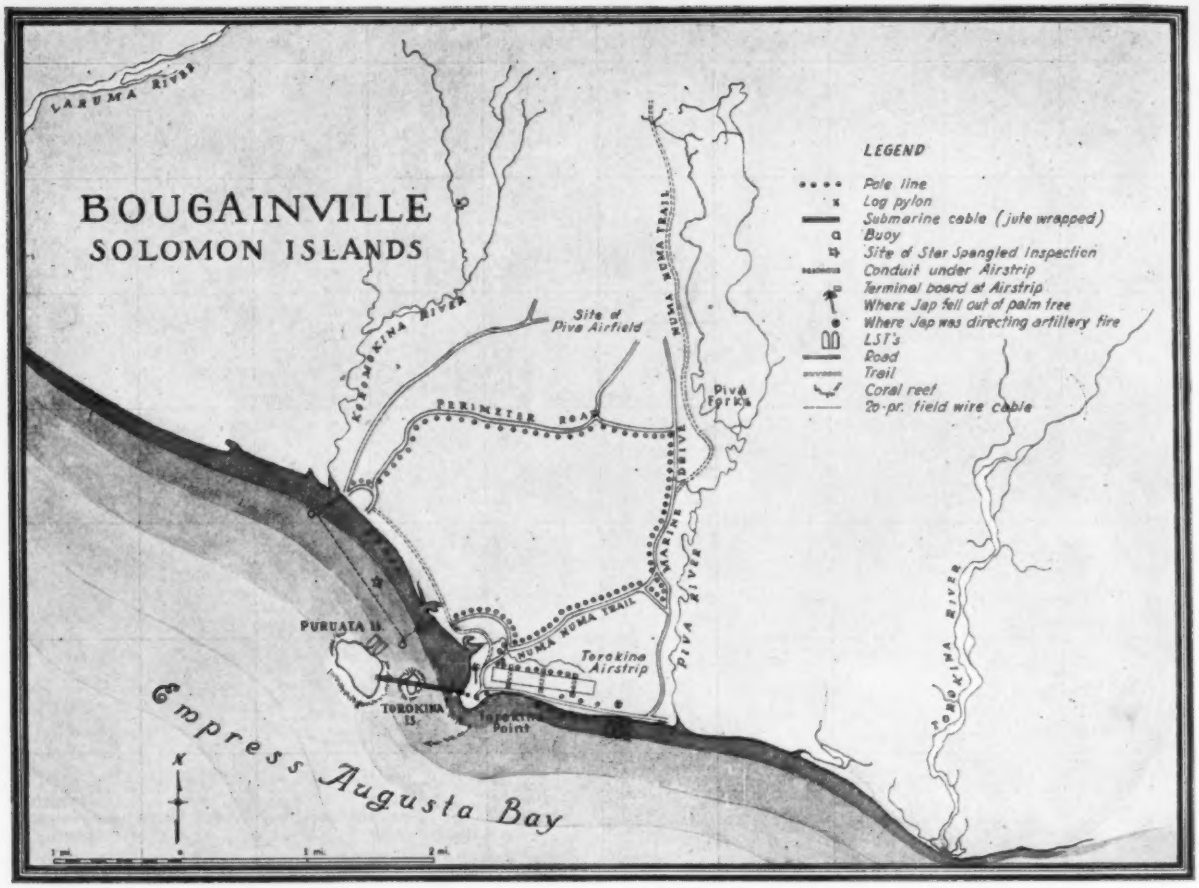
It was weighted down with sand bags and broken; it was weighted down with pickets for barbed wire and the insulation torn off; it was strung up on pickets that were driven into the coral shelf, and then carried overhead to a broken palm above the beach, but not enough clearance was possible and the first big truck that turned out to let another pass ripped it out of the palm. Everything was tried, but no cable stayed in service.

A couple of field wire circuits were made to work by means of setting a guyed pole in the coral shelf and overheading the wires across the beach to that same battered palm. Beyond the coral shelf, however, the bottom dropped out of the sea abruptly, down to over 50 fathoms, and it didn't come up again until, just as abruptly, it leaped on to little Torokina Island or Puruata. That nose dive over the sharp coral ledges was too much for field wire. Its longest continuous period of service was 10 hours. That was during a night.

There is some evidence that the Japs found out about the dump on Puruata Island through indiscrete use of voice radio channels, but it's more likely that they put two and two together when the big LST's began to pull up in plain sight on the Puruata beach instead of on Bougainville. At any rate, on the night of D plus 20 they staged a thorough bombing of Puruata. From end to end that island exploded, and the resulting fires were spectacular in the extreme. They burned for nearly 24 hours and did a lot of damage.

On such a small island (Puruata is about a square mile in area) no effective dispersal was possible. Ammunition, rations, general supply, fuel, all were packed in tightly. Fortunately they didn't all go up. Only the fuel dump was seriously affected, but enough, even of that, was saved to carry on with until more could arrive. The Japs never got a good second try, though a bomb or two did hit the island every now and then throughout the whole invasion period.

During the fire there had to be telephone connections. So field wire and rubber covered cables were hastily laid in the warm gray dawn and, miraculously, most of them stayed in service long enough to accomplish their purpose. Then something better had to be done. A few days before the



bombing, additional elements of a signal battalion arrived on Bougainville and brought with them a few thousand feet of jute wrapped, lead covered cable. That cable was never intended for submarine use, but it did the trick.

By that time there were enough roads so that trucks could go beyond the blasted areas next to the beach, and could get deep enough into the jungle to bring out some logs. Having sized up the Puruata cable situation, a signal construction company took to the tall timber and came out with enough good logs to build four strange structures. Pylons, they were called. One of these was placed on the wide coral shelf at Torokina Point, one on the narrow shelf at Puruata and the others on either side of Torokina Island. From the pylon near the Point to the nearest one on Torokina Island was only about a quarter of a mile and between the other two was still less.

Across Torokina Island and from the pylons at the extremities of the whole crossing to their respective shores, cabled field wires on messenger were put up in order to leave enough of the precious jute wrapped cable in case of a break. That was just as well because later on one of the cable spans became a total loss when a heavy storm took out the log pylons. The other span could be repaired.

Those pylons looked like a cross between an oil derrick and a bell buoy; they were really sea-going towers and were as amphibious as the Marine Corps itself. A coast guard coxswain dubbed them "Empress Augusta's Gushers". From the top of them the cable gushed off to seaward, down into the depths beyond the shelf, with enough of an angle to clear the worst of the coral ledges, while to landward the field wire, with its shore end tied to a tree, was high enough to clear all traffic on the beach.

During the actual laying operation the cable reels were mounted topside of an alligator amphibian tractor. This jute wrapped cable stood the punishment of deep water surprisingly well and, except for that storm, gave no trouble at all—at least until D plus 45, when the Army relieved the marines on Bougainville.

Meanwhile, the wire situation on Bougainville was getting messy. The battle of Piva Forks had been won and the perimeter greatly enlarged. That meant that command posts were advanced and their lines to the rear extended. More units were involved, each with its own wire connections requiring additional trunks. Artillery and anti-aircraft lines were all over the place; lines were beginning to be needed at the airstrip and all organizations were clamoring for inter as well as intra-wire communication.

In order to get it quickly, the wire teams that are part of nearly all organizations strung their lines more or less independently of one another. The result was an appallingly intricate web of wire that covered practically the whole perimeter area.

Wire was fastooned around the airstrip and along the beach in such a tangled skein as to make trouble shooting virtually impossible. The original schematic circuit diagrams and traffic diagrams hadn't exactly been ignored, but they certainly didn't look as well on the site as they had on paper. An accurate line route map of the network on Bougainville would have been an impossibility. Now all that was reorganized.

In the meantime the Seabees practically had finished their famous "Marine Drive," at the eastern beach entrance to which they placed a dedicatory placque reading: "Bougainville, B.S.I., Marine Drive Hi-way. To our very good

• The seabees hand it to the tough marines on Bougainville.

friends and able protectors, the 'Fighting Marines' we dedicate this hi-way 'Marine Drive.' Built by the 53rd NCB. We gratefully acknowledge the help of the 75th C.B."

That highway led to the headquarters of the Third Marine Division and linked it with the whole beachead.

Not to be outdone in the amenities, marines put another sign in a prominent spot. It read: "So when we reach the Isle of Japan, with our caps at a jaunty tilt, we'll enter the city of Tokyo on the roads the Seabees built. (Signed) Third Marine Division, 2nd Raider Regiment."

Along nearly the whole length of Marine Drive, which paralleled the limits of the perimeter, a pole line was built, and on it were placed not crossarms and open wire but rubber covered five and 10-pair field cables and cabled field wires. As soon as these were completed, they were cut into the various organizational switchboards, and the work of recovering the earlier helter-skelter lines was undertaken. Many miles of wire were salvaged, but many more miles were found to be useless for further duty.

The airstrip was enormous, and its surfacing was a gargantuan task. Before it could be completed, several conduits for wire had to be buried under the field. Each of these was filled with 50 field wire circuits, and at both sides of the runways and at the ends of the conduits, terminal boards were set up, ready to receive telephone lines and to extend them underneath the airfield.

While this was going on, a seabee and his bulldozer were busily clearing some straggling palms from the end of the field nearest Torokina Point. To everyone's surprise and chagrin, a Jap observer, complete with walkie-talkie radio, tumbled out of one of those palms! How long he'd been there nobody knows, because the fall killed him. But it isn't nice to think about how much information he'd been able to give and how many American lives may have been lost because of it.

The very same day, another Jap was captured somewhat farther down the beach. This little subject of the Son of Heaven was wearing a New Zealand uniform. That's where he made his mistake. Bold as brass, he was calmly sitting atop a sand dune, in plain sight, directing distant artillery fire against some LSTs that were unloading on the beach. He too had a walkie-talkie and was working it hard when a sharp-eyed marine noticed the "New Zealander." None were known to be on Bougainville, but not very far away, New Zealanders recently had taken part in the capture of the Treasury Islands. Probably that's where this Jap got his camouflage.

Those two incidents point to the fact that it isn't safe to secure all radio watches, no matter how much wire communication may be in operation. Had radios been on the job, both of these enemy walkie-talkies would no doubt have been spotted at once instead of being permitted to function under the very eyes of swarms of Americans engaged in highly important operations.

All this time several wire platoons were trying to bring order out of chaos along the beach. Their progress was slow, because, amid the hundreds of circuits hanging like cobwebs in an old barn, there were many dead and abandoned ones. These had to be sorted out and eliminated while the active lines were kept in service and at the same time collected into an orderly, assembled system. From the western extremity of the most crowded wire section of the beach to the airfield was only about two miles along the shore. From the same point to the airfield, via the perimeter road and the airfield's crossroad (which was along the notorious Numa Numa Trail), was over six miles. The beach route, therefore, was essential even though the other route was complete.

To speed up putting the beach route in order, a temporary measure that turned out to be perhaps the greatest

(Please turn to page 88)

UNDERWATER WIRE COMMUNICATIONS

By Capt. George B. McManus

Captain McManus is the present communications officer of the Post Service Battalion at Quantico, Va. He served in the Southwest Pacific as a platoon commander with the Third Amphibious Corps Signal Battalion. He is a former resident of Kingston, Mass., and entered the service in March, 1942.

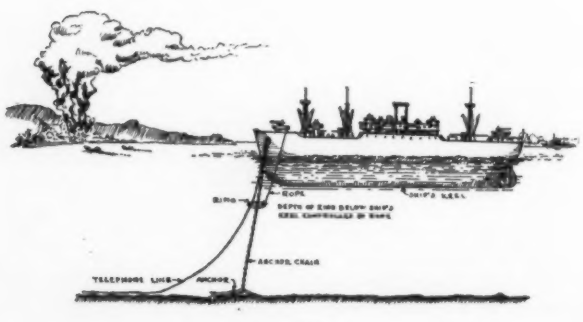
CAPT. McMANUS

DESPITE the advantages of radio, there have been many instances throughout the war in the Pacific when wire installations under water were desirable. Often, because of enemy interception of radio, or because of overcrowded conditions in available radio frequencies, they have been imperative. Wires on shore may be tapped or cut. Wires under the sea are comparatively safe channels of communication, though they do present unusual problems, the solution to which must be improvised locally from whatever materials come to hand.

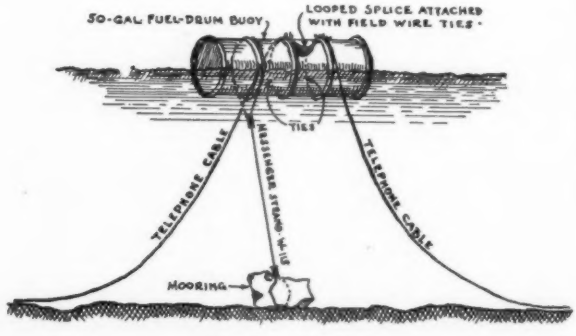
During the first strenuous hours of an amphibious landing, wire seldom plays an important part because of the time required for its installation and because of the risk its installers undergo. Radio is then the star performer. Nevertheless wire goes ashore with the assault waves and gets into operation on the beach very early. Several operations have involved taking not only the main beachhead, but also a number of islands nearby. Between such islands wire has been laid on the sea bottom while landing forces still were pinned down at the beach. Furthermore, in at least one instance, a large vessel has anchored, well offshore, during the initial phase of the attack and has immediately been connected by wire with the landing party. Much more often such vessels have waited for later phases of the operation before attempting a wire connection. When anchored immobility constitutes an unreasonable danger from attack by the enemy's artillery or by his sea or air forces, no such connection, of course, is possible at all, the ship being under way.

An anchored ship is not necessarily stationary; she swings with the wind and tide. Any lines, other than the anchor chain, which lead from aboard to the bottom, therefore, are difficult to maintain. They frequently foul the anchor chain and part. In order to overcome this difficulty it has been found that if the communication wire or cable is passed through a ring, through which the anchor chain also passes, and which is held in place by an independent line at a level well below that of the ship's keel, the several lines do not foul one another and the danger of breaking communication is greatly reduced (See *Fig. 1*). Once clear of the ship and her anchor, a ship-to-shore installation is like any other underwater line. Ship-to-ship lines are rare.

It is generally necessary to make one or more splices in any line, but the type of splice varies with the kind of wire or cable used. When taped splices are necessary, as is the case with field wire (W-110), extra precautions must be taken because such splices have a tendency to leak when subjected to the pressures encountered in deep water. Under these circumstances the splice cannot be left below the surface, but must be elevated by means of attaching that



FIGURE·(1)·



FIGURE·(2)·

portion of the line to a floating buoy which is then firmly moored in place (See *Fig. 2*). As buoys, empty fuel drums are very satisfactory, and as anchor chain for them, galvanized messenger strand (W-115) does well enough. Any substantial weight will moor the whole assembly, but a small, conventional anchor is preferable, though seldom available.

A pair of rubber covered conductors, such as "U-distribution" wire (WD-11/GTC), if used with shield wire (WS-6/GTC) to improve its tensile strength, and to reduce cross-talk if more than a single pair is laid, is often used. On runs upward of a mile long, however, and in deep water, this kind of wire breaks under low stresses in spite of the shield. Splices in "U-distribution" wire are vulcanized and it is unnecessary to buoy them. This wire is reliable for short runs and has remained in service under water for as long as six weeks. Field wires laid under water last less than half as long.

Rubber covered cable (CC-358), known as Spiral-4 because of its four twisted conductors, is much better. Spiral-4 is available in several forms, the most common of which comes in quarter mile lengths, both ends of which are equipped with connectors. When two such lengths are connected together no splicing is necessary, but the connection is not immersion-proof and must be carefully taped and buoyed. Two layers of rubber tape should be wound tightly so as to cover the whole length of the connection and to extend beyond its ends, on to the cable itself. This tape then should be lightly fused with a blow torch. Two layers of friction tape should next be applied over the whole unit. Finally, the entire taping process should be repeated so as to arrive at a finished product having a total of four layers of fused rubber tape and four layers of friction tape, each of these eight layers successively overlapping its predecessor at the ends.

The entire connection then should be looped as shown in *Fig. 3* in order to remove tesile stress. It is possible to splice Spiral-4 without connectors, but because this cable has a braided steel wire sheath beneath its rubber covering, the process is difficult, and the result is clumsy and does not readily lend itself to vulcanizing, even supposing that a suitable vulcanizer is at hand, as rarely is the case. A taped and buoyed splice, therefore, can hardly be avoided for this kind of cable.

Between Kolombangara and Ondonga in the New Georgia group of the Solomon Islands, marines ran Spiral-4 for a distance of about 18 miles under water, most of which was less than 10 ft. deep. This cable remained in operation for five months without developing trouble other than that resulting from its being fouled by the anchors of small boats. That is a hazard common to all underwater installations. Between New Georgia and Rendova, however, another Spiral-4 cable gave considerable trouble because of the many coral formations occurring there, between some of the sharp ledges of which the depth of the water is enormous, and among which tidal currents flow strongly and erratically. Buoying the cable at the worst ledges was effective.

All of the installations mentioned so far can be classified only as temporary or, at best, semi-permanent. When something better is needed tougher cable must be used.

Four-conductor, lead covered, jute wrapped, armored cable (WC-253) is sometimes available, but its electrical qualities are poor because the conductors are not transposed and cross-talk inevitably develops in all but very short spans. Making transpositions at the splices helps a little. For short inter-island crossings this cable is excellent although it was not designed for submarine use. Better designs are found in the rubber or thermoplastic insulated, armored submarine telephone cables, made according to navy specifications for the Coast Guard. These are in five and 10-pair types as well as in several quadded types. The latter are thoroughly satisfactory at nearly all reasonable distances, and may be relied upon to give good service over long periods of time and under extreme conditions. None of them, however, are plentifully available, and they require rather more skillful handling than normally trained troops are usually prepared to give. Specially trained troops are scarce.

When preparing to lay cable, at least 20 per cent should be added to the known length of the run in order to compensate for unavoidable deviation in the course of the boat, and to accommodate unforeseen sub-surface conditions. Accurately detailed hydrographic charts of the Pacific exist for surprisingly little, and many a cable has parted under the strain of its own weight while being innocently laid over some sudden, uncharted precipice. Pre-sounding the depth of the whole run is advisable.

Any light underwater installation should have all of its splices made before laying is begun, and all of them should, in general, be looped in much the same way as is shown in *Fig. 3*. Splices should be handled with the greatest of care when passing the cable overboard, or when attaching it to buoys or to weights, as may be necessary where there is a strong current. The entire length of the cable should be inspected and tested minutely, with particular attention paid to the repair of any nicks, cuts or cracks that might be a source of leakage.

Whenever possible, vulcanized splices, though slow in the making, are preferable to taped ones, but even these must be made with the utmost care to insure that they have been

(Please turn to page 80)

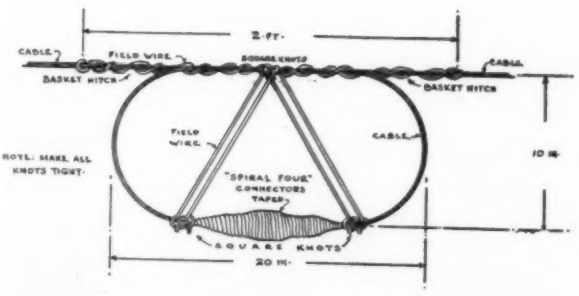


FIGURE (3)

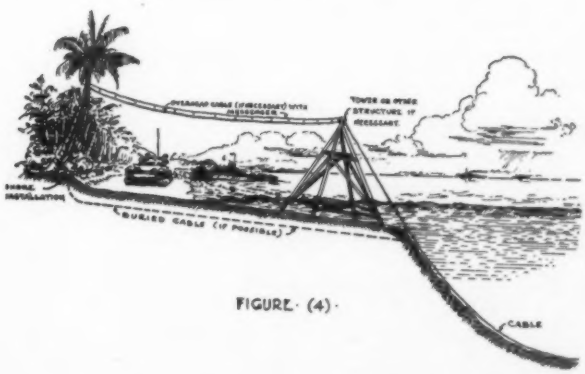
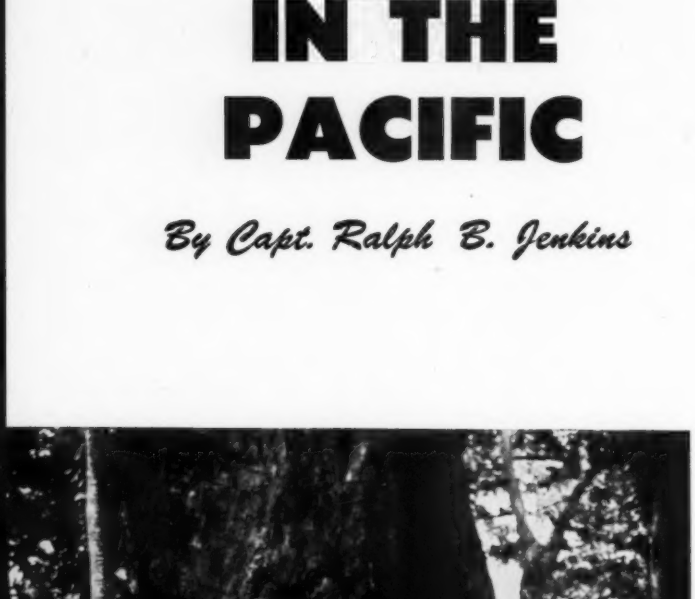


FIGURE (4)

NATIVE TIMBER IN THE PACIFIC

By Capt. Ralph B. Jenkins



● At the base of a jungle giant on New Britain, marines have tied field wire to a nicely sized prospect for use as telephone pole. This particular prospect has a pithy, pulp-like core and is worthless.

UNTIL very recently, telephone poles of American manufacture have been conspicuously absent in the Pacific. That is hard to explain because American piling has been used there lavishly, and certain pole installations have, of course, utilized it. Most poles, however, have perforce been cut on the spot, while on such treeless wastes as Iwo Jima, pole line construction has been on two-by-four or four-by-four lumber, which is standard for light military lines.

Palm trees are the most obvious pole material in the Pacific, but they are by no means satisfactory. Decapitate a palm, and you have a strong, tall spar—for a while. During the dry seasons (and they vary widely in the different archipelagos) a palm trunk will last several weeks, provided it is set in dry soil. That is so because voracious termites abound in humid climes, although they become less vicious if the ground dries out. Let it rain just once, however, and the soil, even the very atmosphere, teems with destructive life. Rain seeps into the palm trunk, especially at the top, and the trunk rapidly turns black with fungus and rot that causes it to break off in successive sections. Palms, if they must be used as poles, should be growing; they must not be cut, and they should retain their natural tops. Fortunately, all coconut palm plantations are planted in regularly spaced rows that, in spite of the hazard of falling fronds, can be used for everything except open wire. One glance at Tarawa after the naval bombardment, however, shows how completely those plantations are devastated.

Next to live palms, the jungle is the handiest source of poles. A jungle is the practically impenetrable "green hell" of popular imagination and an amazing variety of other things. It varies from mangrove swamps and scrub thickets to vine-draped, giant forests. It towers skyward, and it cowers at its own feet; it's as prolific as microbes and it's as sterile as a stone; it's as all-embracing as quicksand and it's as repellant as nausea. The jungle is the enemy of all creatures; it devours its own young, and its young strangle it; the jungle is Moloch, the dark stench of whose corruption is overwhelming.

Amid that darkness it's as impossible to see the forest for the trees as it is to see the trees for the forest, and to find suitable material for poles is, paradoxically enough, something of a problem. Pole diameters have definite limits. To select a jungle tree that is both fellable and within those limits would seem to be a simple matter. It isn't. Giants that soar 200 ft., with diameters of 20 ft. are common. So are spindly saplings and gnarled cripples, but "normal" trees are scarce. Many a fine looking trunk, with a deceptively hard exterior, turns out to have a pithy, pulp-like core of no structural value.

Good jungle poles exist, but they are hard to find. And having found and felled them, it's very hard to get them out. Trucks, and even tractors can penetrate the jungle only a few feet; men with machetes and axes can do about as well—but it's back-breaking work. To get poles from the jungle, therefore, they must be taken from the sides of roads or trails, or maybe they can be snaked down some shallow stream. Generally they're too heavy to float, but if they do float, they're probably bad.

There are no tropical woods comparable to those of temperate climates, no conifers as we know them, no familiar hardwoods except as we find them made up into furniture and none, even, of the usual species of mahogany. Throughout the Pacific there are at least as many different kinds of jungles as there are islands. Each of these jungles contains a botanical world, the details of which are peculiar to itself. To mention only a few of the obvious timber names, there are many mahoganies except the familiar Caribbean ones; there is teak, but not the well known Asiatic kind; rosewood; lignum vitae; ironwood; acacia

and eucalyptus (including the niaouli of New Caledonia) are plentiful; but on no two island groups are any of them alike.

Take ironwood, for instance. There is confusion, even among ourselves, about what ironwood is. In some sections it's another name for mesquite scrub; in others it's called bastard lignum vitae; it's known as holy wood in Mexico and rosewood in Santa Catalina; elsewhere (Jamaica) it's breakaxe, and (California) leatherwood; there's white ironwood in Africa and black ironwood, also red, in South America; in Virginia it's known as hornbeam and in Australia it's stavewood, silverwood and Botany Bay olive. No wonder then, that in the vast spaces of the Pacific, where thousands of miles of open ocean may separate adjacent archipelagos which, on the map, look like stepping stones, there is botanical confusion!

Lignum vitae (Guayacan) is another puzzler. True lignum vitae is remarkable timber, useful for such divers things as bearings in otherwise metallic engines, and bowling balls. Used as a pole in the ground, it lasts indefinitely, untreated, under even the most adverse conditions. It practically turns to stone and is adamantine-hard when cut, but even harder when dry. There are many kinds of Guayacan, all of them are heavy and each has its own distinguishing, Latin terminology, but each in its own district is loosely known as lignum vitae. None of them, however, has the qualities of genuine lignum vitae, and some of the imposters are thoroughly untrustworthy when placed in the ground as poles.

It's dangerous to take the word of local "experts". In civilized places they not only are apt to be ignorant or misinformed, but they always have an ax to grind. Uncivilized, jungle natives are less disappointing because less is expected of them. Primitive men have no notion of what's wanted, yet more often than not they are eager to be helpful, and generally are inclined toward sharp practices only after experiencing some of the less admirable influences of itinerant civilization.

It sound fantastic to use mahogany, teakwood, lignum vitae or ironwood for telephone poles, and fantastic it is. Thousands of them, however, have been used, not only in the Pacific but throughout Latin America and elsewhere. It's an old custom, though a bad one. Its only virtue is that it's born of necessity.

The average weight per foot of treated, American class 7 poles of 25 and 30 ft. and class 5 poles of 25, 30 and 35 ft. all of northern cedar, western cedar, lodgepole pine, southern pine and douglas fir, is just under 14 pounds. The average weight per foot of poles of comparable dimensions of untreated tropical woods is, at a guess, four or five times as much or, say between 60 and 70 pounds. In addition to their great weight, tropical woods are both extremely dense and extremely hard. They are not only difficult to prepare for use and to transport or set, but they resist effective chemical treatment and are difficult to climb with any of the usual climbing gear (including "Belgian tree hooks"). Furthermore, there is no assurance that any of them will serve in the ground for any length of time commensurate with the preconceived qualities that attach to their names or the prodigious amount of labor that their use involves.

Where a treated American pole may stand up for 10 or even 20 years, and a cut palm trunk will stand for less than a month, or a merely decapitated one for somewhat longer, these fabulous tropical trees can be counted on to last only about six months to a year. Some, as stated, will serve indefinitely, but others that look just as good, and are just as difficult to handle, will need replacing inside of three months.

(Please turn to page 86)

● This is a section of beach on Betio Island, Tarawa Atoll, Gilbert Islands, which is a resting place for wounded marines. Note coconut trees.

ABOVE: Marines wrestle a wooden pole made of 4x4 lumber into position for overhead telephone wires on Iwo Jima. BELOW: Tarawa after bombardment. Note Jap crossarms on palms at left and right center.

COMMUNICATIONS IN ACTION

By T/Sgt. Benjamin Goldberg

Sergeant Goldberg, a Marine Corps combat correspondent, is a former reporter for the Boston (Mass.) "Post." During the Pacific fighting, he covered the First Marine Division in action at Cape Gloucester and Peleliu Island. At the present time, he is assigned to a marine-manned aircraft carrier in the Pacific.

T/SGT. GOLDBERG

COMMUNICATIONS, described as the "nerve center" of a military organization in action, is the coordinating effort for all land, air and sea operations. It fuses divergent elements into one powerful unit, making them click like a well coordinated football team.

The Marine Corps has realized fully the importance of signal communications to a modern military machine and has kept in step and, in some cases, has been in the vanguard of developments in this field.

The Division of Plans & Policies is responsible for the signal needs of the corps in equipment, personnel and training. Formerly, the corps used schools provided by other branches of the armed services which were operated by private organizations and industrial firms. At present, most marine enlisted personnel attends school at Camp Lejeune, N. C., where basic instruction is received in radio and telephone operation and installation in the field, as well as advance instruction in highly technical electronics.

Junior communication officers attend the Communication Officers' School at Quantico, Va., where they receive a basic course in all phases of communications. Those who will specialize in advanced work in telephony, such as long lines outside or long lines inside, are sent to the Army's Eastern Signal Corps School at Fort Monmouth, N. J. Senior communication officers attend the Practical Joint Communication Course, Naval Training School (Communication) at Harvard University.

Time spent in these schools and in intensive training in field tactics has paid off when the communication outfits hit the beach in actual operation. The jobs to be done must be done quickly and accurately, for the success of any

(Please turn to page 48)

LEICH

MANUFACTURERS OF TELEPHONES, SWITCHBOARDS

AND RELATED APPARATUS SINCE 1907

● These marine communicators on Saipan set up captured Jap field telephone in excellent working order. Note very small ground rod the marine at the left is holding.

amphibious assault vitally depends on fast communication between various elements of the command.

Radiomen have gone into action from the landing craft before the actual landing. Huddled in the command boat, shielding equipment from rain and spray, a radio operator relays the commanding officer's orders to elements of the landing teams.

Picked communicators go in with the assault teams, usually following in the wake of the first or second wave. At Namur Island, for example, they immediately set up a message center and a switchboard in an enemy dugout on the landing beach. The dugout still was full of Jap bodies and there was such heavy firing going on that it was some time before the men were able to clear out the bodies.

Telephone lines are strung—usually under fire—from the command post switchboard to the commanding officer's position, to his staff officers, to the assault unit command post, to reinforcing elements and the reserve and beach headquarters.

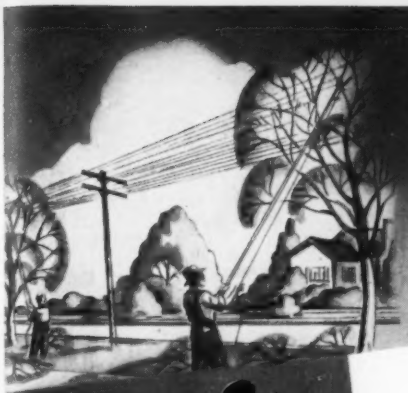
As shore installations progress inland, the message center must be moved up. The temporary command post becomes permanent as heavier equipment and more permanent gear is brought ashore.

At the same time, radio operators in tanks strive to keep their equipment operating so the tank commanders can talk with the infantry units which they are supporting.

When heavy artillery is brought to the beach, forward observer parties of artillerymen, including communication

(Please turn to page 82)

● From a front line artillery observation post at the brow of a hill overlooking the city of Garapan, Marines report results of shelling in the capital of Saipan by telephone.



YOUR BEST MOVE
for tree maintenance!...Tools from AUTOMATIC ELECTRIC

With winter rapidly approaching, now's the time to plan your tree maintenance. Neat, well-trimmed trees not only assure better service for your subscribers (and less bad-weather maintenance for you!) but also help insure the good-will of your community.

You'll find your "best move" for time-saving and efficient tree trimming is . . . tools from Automatic Electric. Every tool shown is the product of a reliable manufacturer and is highly endorsed by practical telephone men. Check our big catalog today . . . there's a tool for every pruning need.

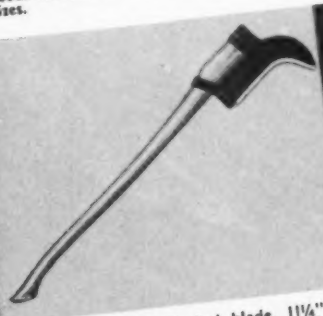
NEWMAN TREE TRIMMER Aluminum alloy head, with cutting parts of high carbon tool steel. Metal parts are rust-resistant.

BUSH SCYTHE AND SNATH Ideal for trimming low growth. Lightweight—easy to handle. Crucible steel blade is easy to sharpen, and holds its edge.

ONE-MAN SAW Handy for tree and pole cutting. Keen cutting edge seldom needs sharpening. Furnished in several sizes.

TUTTLE-TOOTH PRUNING SAW Roomy Davey pattern handle made of air dried beech, reinforced with dowel pin.

SEYMOUR SMITH PRUNING SAW For heavy-duty cutting—16" replaceable blade adjusts to six angles.



BUSH HOOK Hooked blade, 11¼" long, is made of quality crucible steel. Stout hickory handle is 36" long.

SEYMOUR SMITH PRUNER Head has only two moving parts. Highest quality steel blade, vanadium steel spring. Sectional handle.

RECOMMENDED AND DISTRIBUTED BY

AUTOMATIC ELECTRIC
SALES CORPORATION

1033 WEST VAN BUREN STREET, CHICAGO 7, ILL.

STROWGER EQUIPMENT AT BLOOMINGTON, ILL.
The Wabash Telephone Company employs modern Strowger Automatic equipment for toll as well as local switching in its headquarters exchange, and in many of its outlying exchanges in central Illinois.

Facts vs. Assumption

THE FINANCIAL FACTOR vital to the telephone company in a conversion to automatic operation is the cost of operation, maintenance and replacements of the automatic equipment.

THE MAXIMUM COST PER YEAR of the capital invested can be determined in advance for many years. But the telephone company must carry the risk of the other costs when those costs cannot be determined with reasonable certainty in advance of the purchase of the equipment.

STROWGER AUTOMATIC TELEPHONE EQUIPMENT is the only automatic telephone switching equipment manufactured for Independent companies and suitable for large and small multi-office and single-office exchanges, that has been in use in the United States in a sufficient number of places and under a wide enough variety of conditions to provide experience upon which operating, maintenance and normal replacement costs can be based in advance.

FIFTY YEARS OF STROWGER OPERATION in the United States have created records of facts about costs of Strowger operation. With Strowger equipment available, no telephone company needs to experiment financially or otherwise in order to convert to automatic operation!

AUTOMATIC AE SP ELECTRIC

Originators and Developers of Strowger Step-by-Step Machine Switching Automatic Dial Systems
Makers of Telephone, Signaling and Communication Apparatus . . . Electrical Engineers, Designers and Consultants

Distributors in U. S. and Possessions

AUTOMATIC ELECTRIC SALES CORPORATION, 1033 W. Van Buren St., Chicago 7, U. S. A.
Export Distributors: INTERNATIONAL AUTOMATIC ELECTRIC CORPORATION

SIGNAL SUPPLY in the MARINE CORPS

• Marine signal gear on the hoof. A communications platoon moves to the front on Okinawa, having collected wire at the signal depot.

By Lieut. Col. Allen B. Geiger

Colonel Geiger, who is assistant officer in charge of the Signal-Supply Division, Headquarters, U. S. Marine Corps, has served in the Southwest Pacific as signal officer, in the supply service of the First Amphibious Corps. A graduate of the University of Florida, Colonel Geiger entered the military service in 1936.

LT. COL. GEIGER

THE procurement, storage, issue, maintenance, and repair of signal equipment in the Marine Corps is the responsibility of the quartermaster general of the Marine Corps, as it is for all other classes of supplies. The office of the quartermaster general is organized into technical divisions, each division being charged with the accomplishment of the quartermaster general's mission for the equipment peculiar to its technical field. The Signal Supply Division procures, stores, and issues all radar, radio, telephone, and telegraph equipment used by the Marine Corps. Parallel organizations exist in the field. Main depots in the continental United States each have a signal supply division. Overseas depots have signal companies assigned to them.

Signal supply divisions and signal companies of marine corps depots are organized basically into two major sections —the supply section, and the maintenance, repair and salvage section.

The maintenance, repair and salvage sections of the continental depots are equipped for fifth echelon (complete overhaul) maintenance and repairs, and are even capable of manufacturing on a small scale.

Overseas depots are of various sizes, depending upon their mission. Large or base depots are semi-permanent establishments and are almost as well equipped for maintenance and repair work as the continental depots. These base depots support smaller, more mobile depots whose mission is the supply and maintenance of areas within the theatre of operations or direct support of an operation.

The base depots function similarly to continental depots, being large semi-permanent organizations. Large reserves of material are stored in them, and their equipment is heavy, complete, and not easily moved once installed.

The smaller overseas depots, particularly the ones assigned the mission of support of an operation, are quite mobile. These units land right with combat organizations in an amphibious operation, and in some cases have been called upon to participate in actual combat. One such unit

• Difficulties encountered in landing supplies at Iwo Jima are graphically illustrated in this picture taken from the bow of a landing vessel.

has received the coveted Presidential Unit Citation for combat.

These depots land with the purposes of relieving the combat troops of the burden of issuing and distributing supplies as much as possible, and to augment and enlarge upon the repair, maintenance, and salvage activities of the combat troops.

Repair and salvage teams from these depots are assigned to combat units for the operation. Motorized repair shops, complete with test and repair equipment and predetermined stores of critical spare parts, are standard equipment for these teams. Resulting benefits from equipment kept in operation, repaired and reissued, and salvaged for spare parts are immeasurable.

Signal supply in the Marine Corps, like all other military activities, has mushroomed from very modest circumstances prior to December 7, 1941, to what could be termed "big business." The marine corps budget for all types of communication equipment for the year 1941 was approximately $220,000. Current budgets run into scores of millions of dollars.

The Marine Corps uses communication equipment of three major types; i.e., army equipment, navy equipment, and marine corps designed equipment.

Most marine corps telephone and telegraph equipment is of army design. The Marine Corps, whose mission has been amphibious in nature for many years, has found it necessary to develop certain items of telephone and telegraph equipment that deviate from standard army design. Emphasis in these deviations is upon waterproof, light weight, and compact features. Procurement sources necessarily follow in the above channels. That is to say, marine corps procurement is at one and the same time combined with army and navy programs, and for those items of marine corps design, directly with commercial manufacturers.

To date, all things considered, the marine corps signal supply program can be considered as highly successful. While the planning and administration of this program has been and is in the hands of the military, it goes without saying that such plans and administrative directives would have been just so much worthless paper without the communication equipment to carry out the program.

Production of this equipment has been plagued by sudden changes in design, huge increases in requirements that could not be foreseen, and abrupt cancellation of orders. These factors, more often than not, were the result of the recommendations of the individual marine based upon his actual battle experience. In all cases they were dictated by operational requirements.

In spite of these handicaps and interruptions, the manufacturers of communication equipment and their employes have performed miracles in design and manufacture, and are the ones who have made the marine corps signal supply program successful. To them the Marine Corps gives all credit where credit is certainly due.

VE-day has had no effect upon requirements of the Marine Corps for communication equipment. The marines' war has been and is in the Pacific. The end of hostilities in Europe has intensified the activities of the signal supply service in an effort to speed the arrival of VJ-day.

TANK TALE

Somewhere in the Pacific (Delayed)—**Marine Pfc. Melvin E. Lynch of Laramie, Wyo., has discovered the recipe of recipes in preparing Jap chickens, reports S/Sgt. Chester H. Smith, marine combat correspondent.**

The formula, called "chicken a la Iwo," was invented for hungry marines on Iwo Jima. It's best to start with one stray Jap chicken, preferably shell-shocked, Private Lynch says.

"Use a battle knife or bayonet to clean the chicken after removing the feathers that shells haven't already blown off. Wrap chicken in old cloth jacket sleeve, bury at bottom of your foxhole and leave to roast overnight in volcanic-heated ground. Serve hot."

• Some of the supplies and some of the more than 1,400 ships that took them to Okinawa. This busy scene is at an advance base in the Pacific Zone.

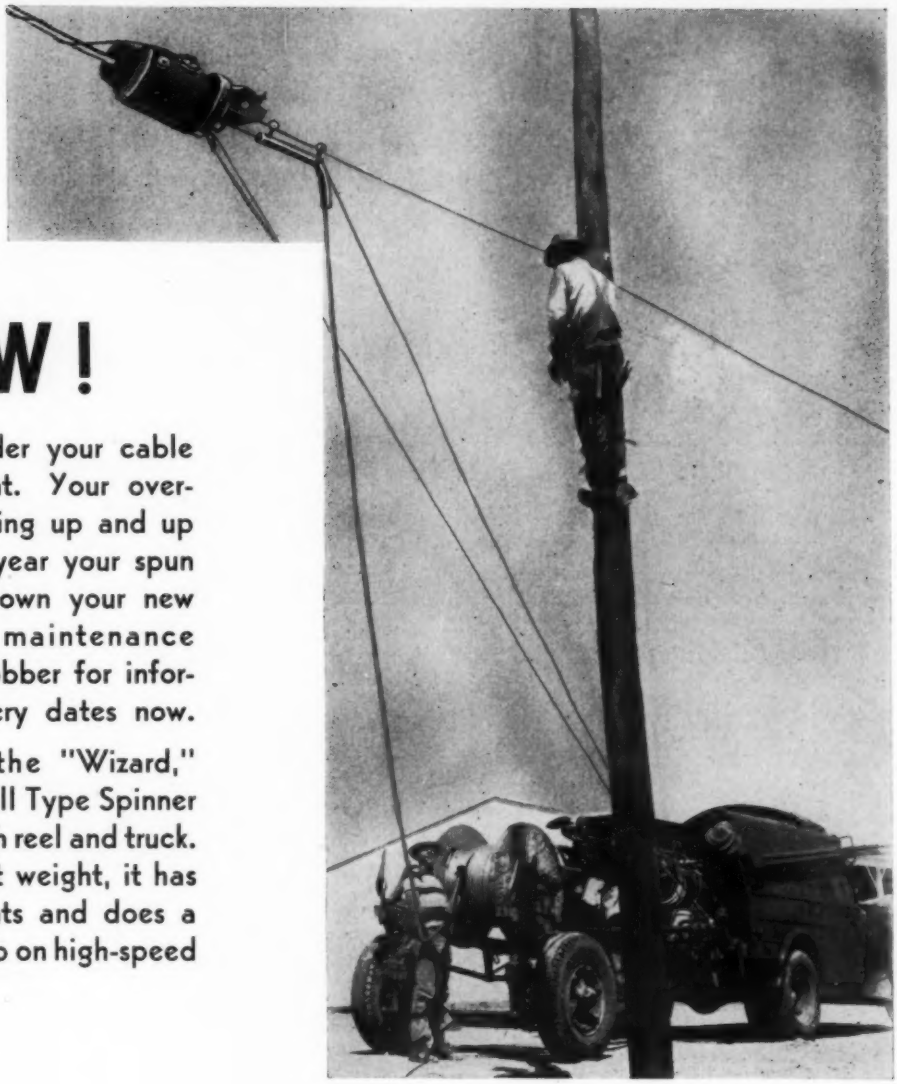
"LOOKS LIKE WORKING WEATHER"

Every telephone repairman knows that the toughest jobs usually have to be done in the roughest weather. When the day is biting cold and blowing hard, or snow is cross-arm deep, or flood and storm have done some tricky work, that's when the "hurry-up" calls come in. But to the seasoned lineman "it's all part of the job." He takes what comes, when and as it comes, upholding the telephone tradition of faithfulness and dependability.

In Exide Batteries you will find the same dependability for which telephone service is famous throughout the world. Since 1895, Exides have been proving themselves worthy of that trust.

Exide
TELEPHONE BATTERIES

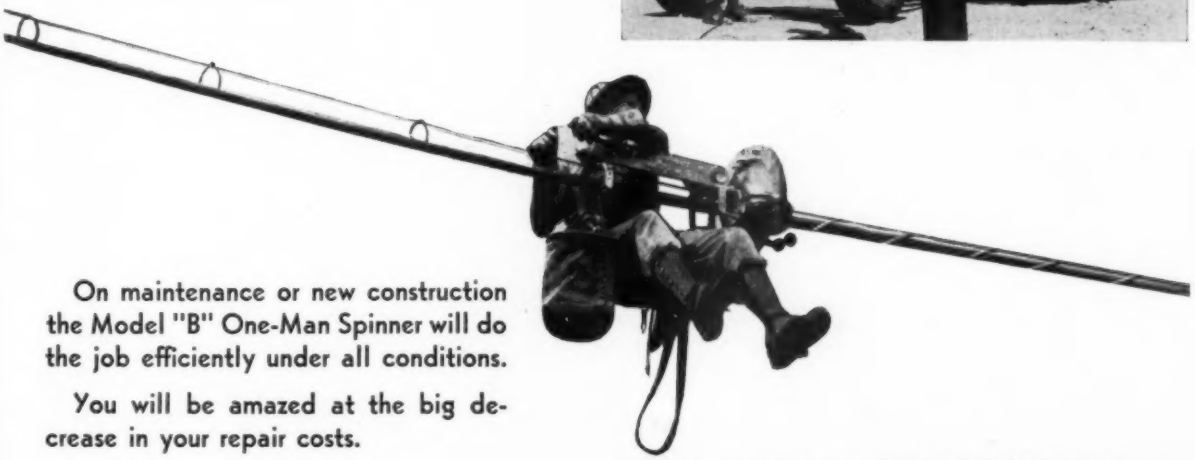
THE ELECTRIC STORAGE BATTERY CO., Philadelphia 32 • Exide Batteries of Canada, Limited, Toronto



NOW!

is the time to order your cable spinning equipment. Your overhead costs are going up and up—but year after year your spun cable will hold down your new construction and maintenance costs. Ask your jobber for information and delivery dates now.

Picture shows the "Wizard," new Model "D" Pull Type Spinner spinning direct from reel and truck. Compact and light weight, it has all the requirements and does a perfect spinning job on high-speed new construction.

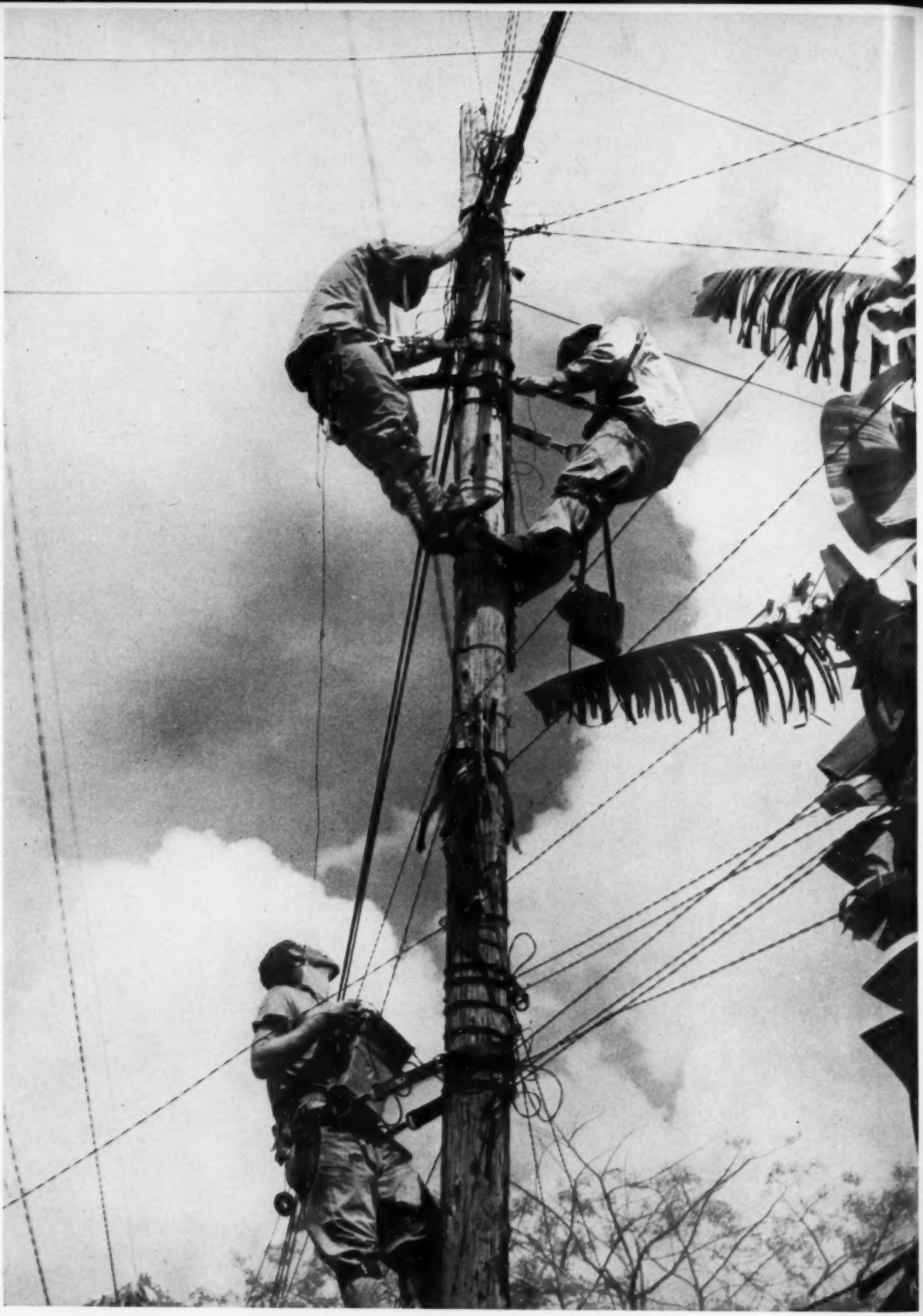


On maintenance or new construction the Model "B" One-Man Spinner will do the job efficiently under all conditions.

You will be amazed at the big decrease in your repair costs.

IT IS A WELL WORN PHRASE, BUT—
"ASK THE MAN WHO OWNS ONE."

CABLE SPINNING EQUIPMENT CO., Topeka, Kans.



• These lines carried vital information on Saipan. Few trees, shortages of poles cause concentrations of lines, giving "headaches" to trouble shooters.

FIELD ARTILLERY and COMMUNICATIONS

By Lieut. Col. Howard V. Hiett

Colonel Hiett, who is the officer in charge of the Ordnance Subsection, Division of Plans & Policies, at Headquarters, U. S. Marine Corps, is a veteran of the Guadalcanal, Tarawa and Saipan operations. He was wounded on Saipan and later was presented the Purple Heart and the Legion of Merit awards.

LT. COL. HIETT

THE first objective of war or of plain self-preservation has been to kill the enemy and destroy his forces. As the ages and wars have passed, man has devised many new methods of liquidating his enemies. Of great importance among them is the use of field artillery and the manner in which telephony has influenced tactical employment of this strong arm of our land forces.

Each new development of a major weapon or arm has demanded, or been based upon, the development of a "secondary weapon." Communications equipment has become the most important field for improved "secondary weapons." Few, if any, of the enemy have been hit on the head with a telephone or microphone, but these instruments have spelled doom to thousands of enemy just the same.

Artillery had its beginning before David took a heavy missile and slew the giant, Goliath. The need was for a heavy object that would kill or injure the foe before one had to close with him. As time progressed and gang or clan fights developed, certain forces acted as infantry and others backed them up by heaving heavy stones over their heads to destroy walls and other fortifications. Hence, the catapult came into being.

With the development of gun powder, the crews of the catapults became vulnerable to small arms fire and the cannon came into being. At first the cannon were muzzle loaders and were wheeled into the front lines and fired point blank at what we now call "targets of opportunity." The ranges were short and the effect rather doubtful. The communications equipment employed was nil. Time marched on, and soon there were batteries of four guns which attacked the same targets. At that time the artilleryman had leather lungs as well as hairy ears. Finally, a little French officer named Napoleon started to develop artillery technique, and did quite well with it. It became one of his most important arms, and under his guidance soldiers replaced the civilian experts in the artillery units.

Throughout the years the development of artillery and its communication systems has advanced slowly, but during the relatively few years since World War I, there have been great strides forward. The day of the battery is gone. A battalion has become the basic fire support unit. Several battalions can concentrate their fire on a single target in a matter of a few seconds. The effect of this concentration of fire has been felt in this war by our enemies. All of these changes have been the result of years of experience in tactical employment, the development of guns, ammunition, and motor transport for the movement of the artillery pieces.

(Please turn to page 84)

● A marine wire crew moves out on another mission on Iwo Jima. The telephone lines must go through, regardless of most difficult conditions.

● Marines on Peleliu operating fire direction center. Many requests for artillery support are translated into actual commands for the guns.

The RECORDGRAPH*

Closeup of Recordgraphs in the Navy Radio Station on Guam.

A battery of Recordgraphs aboard an Admiral's Flagship.

Marine Correspondent with a Recordgraph at a battlefront.

Coast Guard Records Invasion Exploits with the Recordgraph.

For All Communications Recording and Monitoring, Hour After Hour Without Interruption

THE Recordgraph* is designed especially for Communications and Authorized Telephone Recording, Investigations, Conferences, Radio Interception, Narration, Control Centers, Ships, Planes, Mobile Equipment, and wherever else permanent recording of Sound, Speech, or Code is desired. It is invaluable for training purposes, sound analyses, recording telephone orders or complaints, checking speech, manners and efficiency of telephone operators.

This is the Famous Film Recorder which is used by the U. S. Navy, Signal Corps, Marine Corps, Coast Guard and Air Corps, as well as by the major radio networks and independent stations.

The Recordgraph is also employed by many police, fire and other municipal, state and Federal Government agencies in their communications and law enforcement monitoring.

A compact, self-contained unit, the Recordgraph* provides hours of continuous (many more of intermittent) recording, without changing media. The recording, permanently embossed on 35mm. plastic Amertape,* needs no processing. Instant playback of any portion, amplified through built-in loud speaker, is strong and clear.

This recorder has many outstanding advantages — the Audiotrol which automatically actuates the recording mechanism on the incoming voice or signal, manual or remote start and stop, automatic volume control. The model shown above weighs about fifty pounds, and is supplied in compact, durable traveling case. Other models for incorporating in control racks and panels.

*Reg. U.S. Pat. Off.

For Demonstration and Complete Information Address:

FREDERICK HART & CO., INC.

A subsidiary of American Type Founders

350 MADISON AVENUE **NEW YORK 17, NEW YORK**

HERE'S a ductway which effectively withstands the corrosive action of all types of soil normally encountered in cable installation.

This advantage of Transite Ducts is shown in a series of tests conducted over a two-year period by an independent research agency. Through cinder fills, salt marshes, peat bogs, clay, loam and many other aggressive soils, laboratory men found that these asbestos-cement ducts actually became stronger, more durable with age.

Transite Ducts are also unaffected by gases and condensates. In addition, they have a permanently smooth bore which makes cable pulls easy and speeds up replacements. Easy handling and rapid, economical installation are assured by their light weight and long lengths.

Made in two types: Conduit, for exposed work and for use underground without concrete encasement; and Korduct, for installation in concrete.

For details, write for Data Book, DS-410, Johns-Manville, 22 E. 40th Street, New York 16, N.Y.

JOHNS MANVILLE JM PRODUCTS

Johns-Manville

There is an office near you

TRANSITE DUCTS

CONDUIT for use without concrete

KORDUCT for concreting in

THE MAHOGANY POLE LINE ON GUADALCANAL

By Lieut. Col. Harold B. Meek

Colonel Meek, officer in charge of the Signal & Electronics Subsection for Plans, Operations & Training, U. S. Marine Corps, served in the Southwest Pacific as commanding officer, First Amphibious Corps Signal Battalion. He was awarded the Legion of Merit for meritorious service on Guadalcanal. He entered the service in 1936.

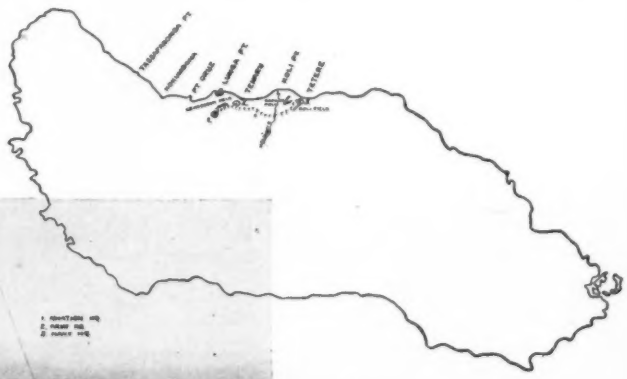
LT. COL. MEEK

ON FEBRUARY 9, 1943, the last Japanese soldier had withdrawn from Guadalcanal, British Solomon Islands, and United States forces found themselves in complete control of the island. Improvement and construction projects on highways, air fields, supply dumps, docks, and bivouac areas were being rushed to completion to convert the island into a base capable of supporting further offensive action against the Japanese.

The enemy, although driven from Guadalcanal, was far from defeated and possessed strong garrisons on other islands in the Solomons. It was imperative that United States forces take the offensive at the earliest practicable date and seize other Solomon Islands strongholds of the enemy before he could prepare his defenses further and reinforce his garrisons.

The communication situation on Guadalcanal at the end

● Native Melanesians from neighboring island of Malaita tend an assortment of wire reels on Guadalcanal. The middle reel is G-1, on RL-17; all the rest are home made and all different.



of February, 1943, was anything but ideal. Forces on the island were encamped from Tassafaronga to Tetere, a distance of about 45 miles. Two major air installations had been completed or were in the process of being completed. Henderson Field, with its fighter strips No. 1 and No. 2, was located just inland from Lunga Point and about 30 miles south of Tassafaronga. The other air installation, at that time nearing completion, was located in the Koli Point area, which was about three miles north of Tetere and 12 miles south of Henderson Field. Communications between all points were maintained by field wire circuits and, in some cases, by field radio. Transmission was poor and maintenance of long field wire lines was a difficult and endless task.

In order to mount a successful offensive against the Japanese positions on the islands to the north, better communications had to be established, and it was imperative that an improved system be operating by June 1, 1943. It was decided that an open wire pole line to accommodate 10 pairs was the solution to the communication difficulty existing between Henderson Field and the Koli Point area. This pole line would have to be completed by June 1, 1943, if good communications were to be available prior to the mounting of the operation for the capture of Rendova, New Georgia, Kolombangara, Vella Lavella and the Treasury Islands.

Requisitions were rushed to army and navy headquarters in New Caledonia for necessary supplies, and work was started immediately to set the poles on the selected route. These poles, for the most part white mahogany, were cut from the jungle along that route.

Personnel available was limited to one marine officer, one army officer, and 12 army and marine enlisted men. This force was augmented by two native labor sections of 25 natives each. Native laborers were Malaitians from the nearby island of Malaita.

Work was started at opposite ends of the line and poles were set by use of strong native backs and two caterpillar tractors. Holes for the poles were dug by the natives, whose I.Q. averaged about 10 years and necessitated a white supervisor for every two pole-digging parties. Throughout the entire project, these natives never learned to dig a straight sided hole, and unless closely supervised invariably would dig a hole shaped like a funnel.

It was necessary to set 1,050 poles. By May 1, this task had been completed. The line of poles crossed three rivers, three miles of Kunai grass plains and about six miles of dense jungle where the right of way had to be hacked out by hand with machete and ax. This work was done by the native laborers who, mysteriously, were able to move about through the mass of briars, vines, and thorny growth barefooted and clad in nothing more than a lavalava.

Common to the island of Guadalcanal is a species of large lizard about four feet in length and considered by the natives as a remarkable delicacy. The white men, working on the project, never succeeded in accustoming themselves to seeing the natives prepare a noon meal of rice and partially cooked lizard.

By the time three-quarters of the poles were in place, the wire, crossarms, insulators, and hardware for the pole line had arrived. It developed that open wire pole line equipment was at a premium in the Southwest Pacific, and that many items were not procurable. There were no transposition brackets, only about half enough crossarm braces, no strongbacks, no anchors, no pole steps, very few curved washers, and only about one-fourth of the through-bolts that were required.

Before all the poles were in place, a crew of marines, consisting of two experienced linemen and four men from a tank platoon, was put to work placing the crossarms. Poles had been gained and bored for through-bolts before they were set. The crossarm crew made rapid progress until it ran out of through-bolts and ran into trouble with a few bulls. These bulls were from a herd of Asiatic cattle that had withdrawn into the foothills to escape the fighting and the appetites for fresh steaks that prevailed among all personnel who experienced life on Guadalcanal. The bulls came out of the jungle on to the Kunai grass plain and took great pleasure in scratching their backs on the carefully set poles.

(Please turn to page 90)

• Marines pulling in wire across the Kunai grass plains of Guadalcanal.

• Sagging the wires at a white mahogany terminal pole on Guadalcanal.

RUBBER AND PLASTIC INSULATION

ENDURANCE

Dropwire (Bronze Copperweld, Copper or Iron)

TELEPHONE WIRES

BRIDLE, INTERIOR & DUCT

FIXTURE, TREE & GROUND

GENERAL INSULATED WIRE WORKS, INC.

65-105 GORDON AVENUE • PROVIDENCE 5, R. I.

TELEPHONE—HOPKINS 2100

Having served the war effort 100% . . . our facilities are now available to the telephone industry.

"Zophar Quality Goes Far"

ZOPHAR

WAXES

TO YOUR SPECIFICATIONS

POTTING COMPOUNDS AND WAXES for wire, cable and junctions.

•

WAXES AND COMPOUNDS for switchboards, coils, transformers, condensers, and all types of electronic devices.

Tell us your requirements

ZOPHAR MILLS, Inc.
Established 1846
140—112 ST., BROOKLYN, N. Y.

dependable
Cedar Poles
MICHIGAN POLE & TIE CO.
NEWBERRY—GRAND RAPIDS
MICHIGAN

Cedar Poles
MAC GILLIS & GIBBS COMPANY
Wells Bldg., Milwaukee 2, Wis.
★ ★
Northern White and Western Red
Cedar Poles—Plain or Butt-Treated

POLES

B. J. Carney & Co., 100 N. 7th St., Minneapolis, Minn.—Western red cedar poles. Pentrex Butt Treated or Plain.

C. M. Christiansen Co., Phelps, Wis.—Northern White Cedar Poles, plain or butt treated.

International Creosoting and Construction Co., Galveston, Texas.—Creosoted Southern Yellow Pine Poles. Plants: Beaumont and Texarkana, Texas.

T. M. Partridge Lumber Co., Minneapolis, Minn.—Northern White—Western Red Cedar Poles. Plain or butt-treated.

Pensacola Creosoting Company, Pensacola, Fla.—Creosoted Southern Pine. Poles of Superior Long Leaf Quality.

Best Story of the Week—What's Yours?

The *Gulf Stream Bell*, published by the Southern Bell Telephone & Telegraph Co. for the West Palm Beach, Fla., traffic district, reports this occurrence:

The distant operator, after passing her request for a circuit, was given a three to four hour delay. Not quite understanding delays, the operator in trying to help the distant operator, advised her to try her call again in three hours. A meek voice replied, "I'm sorry, operator, I can't. I won't be on duty then."

No Nickels Required

A public telephone is something new to many a South Pacific island.

For the convenience of officers and enlisted men alike, however, Leatherneck signal units usually install a public telephone in all organizational wire systems.

Because of the possibility of getting lead poisoning, the customary nickel for the operation of such a telephone is not necessary.

ENGINEERS

Telephone Equipment Engineers or —

Men with some knowledge of drafting, ordering, and installing wired equipment, are urgently needed. Write

Employment Manager,

WESTERN ELECTRIC CO.
Hawthorne Station,
Chicago 23, Illinois

MANAGEMENT ENGINEERING SERVICE
APPRAISALS—RATE SURVEYS
MAINTENANCE ENGINEERING
MANAGEMENT AND OPERATING SYSTEMS
SUPERVISORY TRAINING—PRACTICAL AND LONG RANGE METHODS
407 South Dearborn, Chicago, Illinois

ATLANTIC
Creosoting Co., Inc., 17 Battery Pl., N. Y. C.
Creosoted Pine Poles
Crossarms . . Conduit
PLANTS AND OFFICES:
New Orleans, La. Jackson, Tenn. Boston, Mass.
Winnfield, La. Louisville, Miss. New York, N. Y.
Norfolk, Va. Savannah, Ga. Philadelphia, Pa.
Annapolis, Md. Chicago, Ill.

UNDERGROUND CONTRACTOR
TILE CONDUIT WORK—MANHOLES
BURIED CABLE TRENCH
SEYMOUR CORLEY
220 N. FRINK PEORIA 5, ILL.

Frank F. Fowle & Co.
Electrical and Mechanical
ENGINEERS
35 East Wacker Drive CHICAGO

ACCOUNTING
HERDRICH, BOGGS and CO.
Certified Public Accountants
803 Electric Building
INDIANAPOLIS 4, IND.

SLOAN & COOK
CONSULTING ENGINEERS
120 SOUTH LA SALLE STREET
CHICAGO
Appraisals—Original Cost Studies
Depreciation, Financial, and Other Investigations

MANFRED K. TOEPPEN
Engineer
Consultation • Investigation Reports
261 Broadway, New York 7, N. Y.

INSPECTION SERVICE
For poles, crossarms, and other timber products. Preservative treatments of timber products. Analyses of wood preservatives.
A. W. WILLIAMS INSPECTION COMPANY
Main office and laboratories: Mobile, Ala.
Branch offices: New York and St. Louis.
Inspections handled at timber treating plants.

J. G. WRAY & CO.
Consultants
Plant—Engineering—Traffic
Fundamental Plans
Equipment Type Studies
Valuations and Analyses
for Rate Adjustments
Original Cost
Continuing Property Records
231 S. La Salle St., Chicago
Tel. State 9556

We can offer Rebuilt

MAGNETO SWITCHBOARDS

50 line
100 line
165 line

Western Electric and Kellogg rebuilt switchboard drops and jacks.

★

Write us your requirements.

★

TELEPHONE REPAIR & SUPPLY CO.

Daniel H. McNulty, Manager

Rogers Park Station 26 Chicago

Telephone Watch With The Marines

By SGT. JACK VINCENT, U. S. Marine Corps

Saipan, Marianas—Standing a night telephone watch with the marines on the front lines of Saipan during the battle against the Japs is like listening in on an old-fashioned party line back home.

One night, on the front lines where we were under machine gun and sniper fire from the Japs, I stood the night listening post watch at the telephone.

Our line was connected to four other units on our flanks through a central switchboard at a command post. Because even the slightest ringing of a telephone bell might betray positions to the enemy, watchers must keep their ear glued to the ear piece at all times, every second, during the night.

During the early part of the evening, when danger of a Jap attack was small, conversation on the line was quite brisk. The central operator, farther back from the lines at a point where he did not have to muffle his voice, relayed to us the official news of the day and a lot of rumors—the usual scuttlebutt. Among other things, the operator told us it had finally been announced in the states that the veteran Fourth Division, of which we are members, had been among those to land on Saipan.

Others on the line had to talk in whispers, so their voices would not be audible outside their own foxholes. There was tragedy, homesickness, humor reflected in the conversations. A report from one "listener" on the line—just the words "Jim had his today"—told simply of a marine who died in battle.

Then talk veered to home towns back in the states. A hushed voice told of its owner receiving new snapshots of his best girl. Another speaker went through his stock of best jokes. Every 15 minutes the central operator would break in to check that every man was still awake at his post.

Alternating on the watch with me was Pfc. R. L. Morris of Babylon, L.I., N.Y. During one catnap, Private Morris was awakened by a heavy explosion in a valley 300 yards from us. A huge fire broke out and it burned fiercely.

He told me to ask what it was. After listening to a description from a watcher almost directly in front of the fire, I told him it was a fuel dump.

"It's inside the Jap lines," I added.

"Ain't it beautiful," he said.

Then he went back to sleep.

QUEEN INSTRUMENTS FOR THE TELEPHONE INDUSTRY AND THE SIGNAL CORPS

E-3108C

E-3108C—"Queen" Dial Decade Set

A compact portable bridge set, complete with contained galvanometer and battery, for the measurement of resistances and the location of line and cable faults.

The ratio arms are controlled by a single dial.

Seven multipliers of 0.001—0.01—0.1—1—10—100—1000, accurate to 0.5% and four resistors for Murray Loop Test.

Rheostat comprises four decades 10x1—10x10—10x100—9x1000 and Infinity. Rheostat coils accurate to 1/10% and bridge coils to 1/20%.

Resistors are wound non-inductively on non-metal spools.

E-1022C

E-1022C—"Queen" Dial Decade Wheatstone Bridge

Rheostat has four decades 10 (1+10+100+1000) and a single dial control for ratio arms.

Seven multipliers 0.001—0.01—0.1—1—10—100—1000. Adjusted to 1/20% in bridge arms and 1/10% in rheostat.

This bridge offers a wide range of usefulness. It is a convenient form for conductivity measurements.

Coils are bifilar wound on bakelite spools.

E-1645-B

E-1645-B—Four Section Resistance Unit

Four coil resistance box. Bifilar wound on bakelite spools.

Accuracy 0.1%.

Mounted in bakelite case measuring 6" x 2½" x 1".

Can be supplied in combinations of four (1-2-2-5: 10-20-20-50, and so on) up to total of 10,000 ohms.

GRAY INSTRUMENT CO.

64 WEST JOHNSON STREET, GERMANTOWN, PHILADELPHIA 44, PA., U. S. A.

Linemen Say IT'S GOOD...

and they should know

Bethlehem's serving tool has the look of a "gadget" and a funny one at that. Yet linemen will tell you that it's one of the handiest little devices that ever came along.

It was designed for making serves on Bethlehem strand by the dead-end coil method. This type of serve consists of a neat, strong wrapping of 11-gage bethanized wire around the dead end. Extensive tests have proved that the serve holds beyond the useful strength of the strand.

Even a novice can learn the technique in a few minutes' time. The lineman simply hooks one end of the wire to the strand, as shown, and engages it between the two fingers of the tool. A simple rotary motion does the rest. It takes about the same length of time as attaching conventional clips, but is less expensive. A 10-foot coil of bethanized dead-end wire costs only a few pennies.

We strongly recommend that you equip your linemen with these tools, which are intended primarily for use with Bethlehem strand. That makes a winning combination, for Bethlehem strand is flexible, uniform . . . always easy to handle . . . and armored against corrosion by a bethanized zinc coating of high purity. This coating is so ductile that it is not displaced to any harmful extent by the action of the serving tool.

Write Bethlehem Steel Co., Bethlehem, Pa., for further details. We'll gladly supply them.

★ BETHLEHEM STEEL ★

RADIO and TELEPHONE in WARFARE

By T/Sgt. Benjamin Goldberg

ON THE mainland, communication has to be fast. On the islands, it has to be faster.

In other words, the radio and telephone have gone to war with the marines. Already established as a vital part of mainland warfare, electronic communication has found, perhaps, its most intense use on those super-concentrated battlegrounds—the islands of the Pacific.

There, often a man cannot see or hear an enemy who is only a few yards away in the jungle. And since island combat is intense, sudden death in character, a few seconds can make the difference between a successful and a repulsed landing. Under such conditions, the telephone and radio are the electronic eyes and ears of the embattled leathernecks.

They are the most important elements of the command post—nerve center for marine assault forces.

Communication men, who hit the island beaches with the first assault troops, install wire lines and switchboards, operate radio sets and message centers on which depend the lives of the fighters who make the first beachhead.

Meanwhile, other communication men, many of them telephone linemen in civil life, string literally hundreds of miles of wire, undersea and across sands and through jungle underbrush right up to, and even beyond, the front firing lines. They establish a complex telephone network, over which travel vital commands, reports and instructions, and by means of which mortar, shell and rifle fire are directed. Still other communication men string lines which control the anti-aircraft fire defending the beachhead.

These radio and telephone communication channels are maintained at all cost, often in the face of heavy rifle, machine gun and shell fire.

Graphic accounts of the radio and telephone in action have come back from the Pacific.

On Bougainville, a marine combat correspondent wrote: "From the day of invasion . . . marine communicators spun an ever-widening web of wire over the beachhead. Their radios and telephones flashed the word to attack from our headquarters to units on the line."

On Roi and Namur islands, telephone centrals linking all command posts of the assault division were set up within 45 minutes after the initial marine landing. The landing, itself, was made with the aid of radio communication between ship and shore parties. All marine units were in constant touch with each other five minutes after the first attacking wave of men hit the beach.

"Then began the dangerous task of replacing radio com-

munication with telephone lines and a switchboard," wrote Combat Correspondent Bernard S. Redmont. "Every telephone lineman went out with a guard who answered Jap sniper fire. After the communication system had been established, trouble shooters were sent out regularly to repair lines cut by the Japs or accidentally broken by our own tanks or tractors."

The Japs have several tricks which they employ to harass communications and signalmen. One is to cut only one-half of a twisted pair of wires, ruining communications, but making it impossible to determine, by pulling the wire, that the line has been cut.

Where wires have been strung on trees, the Japs cut the line at the highest point, usually where it is tied, so that linemen cannot be certain of the point of severance until they've climbed the tree.

Also, they drag ground wires into caves and pound them between rocks, forcing trouble shooters to enter dangerous caverns to locate sources of trouble. This happened frequently on Saipan, in the Marianas campaign. One platoon of communicators had its lines slashed six times in one hour.

Weather in the South Pacific is one of the communicator's worst enemies. Rain, humidity and mud play havoc with telephone equipment, and salt water is death to radio instruments. Signalmen frequently spend hours drenched to the skin while their poncho protects their apparatus. Noise, too, is a foe to communication personnel for when a period of quiet comes, the sound of hand generators, operating radios, attracts Jap snipers.

Marine combat units depend chiefly on telephone, radio and the walkie-talkie or radio-telephone, for communications, though semaphore and blinker systems also are used when necessary. Higher echelons make use of the teletype and carrier telegraph or telephone.

To the infantryman, to the artilleryman or the tankman, communications is one of the most vital of all his needs in battle and he has a profound respect for the men who provide it.

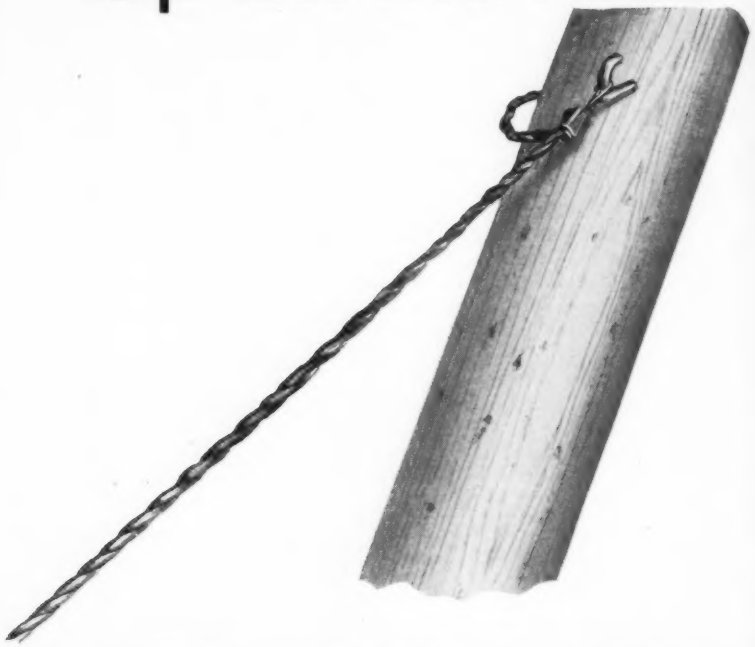
● In the first regimental command post established on Peleliu, marine switchboard operator takes over communications while radioman crouches with equipment still set up, ready if telephone connections fail.

● Terminal board put in order after an island has been secured, shows extent of telephone traffic in Pacific. The "cables" emerging at foot of tree are taped-up telephone field wire.

● Marines man message center on Saipan. Note the small field telephone switchboard at left and teletypewriter in operation.

Right

Up on the Pole



MONOTYPE DROP WIRE

Up there on the pole, battling the wind and weather, Monotype Drop Wire proves its worth. It's built *right*, because it's built specifically for the job, by experts who make almost every type of wire and choose Monotype construction as best for telephone distribution. From the conductor itself, to the slick-smooth mica-fortified coating, every step in its construction builds up to the finest wire for its purpose.

When you must buy drop wire, be sure you get Monotype quality. And please order well in advance of anticipated requirements.

MANUFACTURED FOR

AUTOMATIC ELECTRIC COMPANY

By GENERAL CABLE CORPORATION

DISTRIBUTED BY

AUTOMATIC ELECTRIC
SALES CORPORATION

1033 WEST VAN BUREN STREET • CHICAGO 7, ILLINOIS

Full speed ahead on NEW TELEPHONE EQUIPMENT

Since the war ended, thousands upon thousands of new telephones have been produced and installed.

Hundreds of miles of telephone cable have rolled out of Western Electric plants to provide more circuits.

Central office switchboards and other equipment are being manufactured with all possible speed.

Much of this equipment is extremely complex—not only to *make* but also to *fit into the Bell System network.* Naturally shortages caused by four years of war cannot be made up for overnight.

Supplying materials and equipment for the Bell System's $2,000,000,000 construction program promises record *peacetime* volume and a level of employment at Western Electric higher than in the years immediately preceding the war.

Western Electric

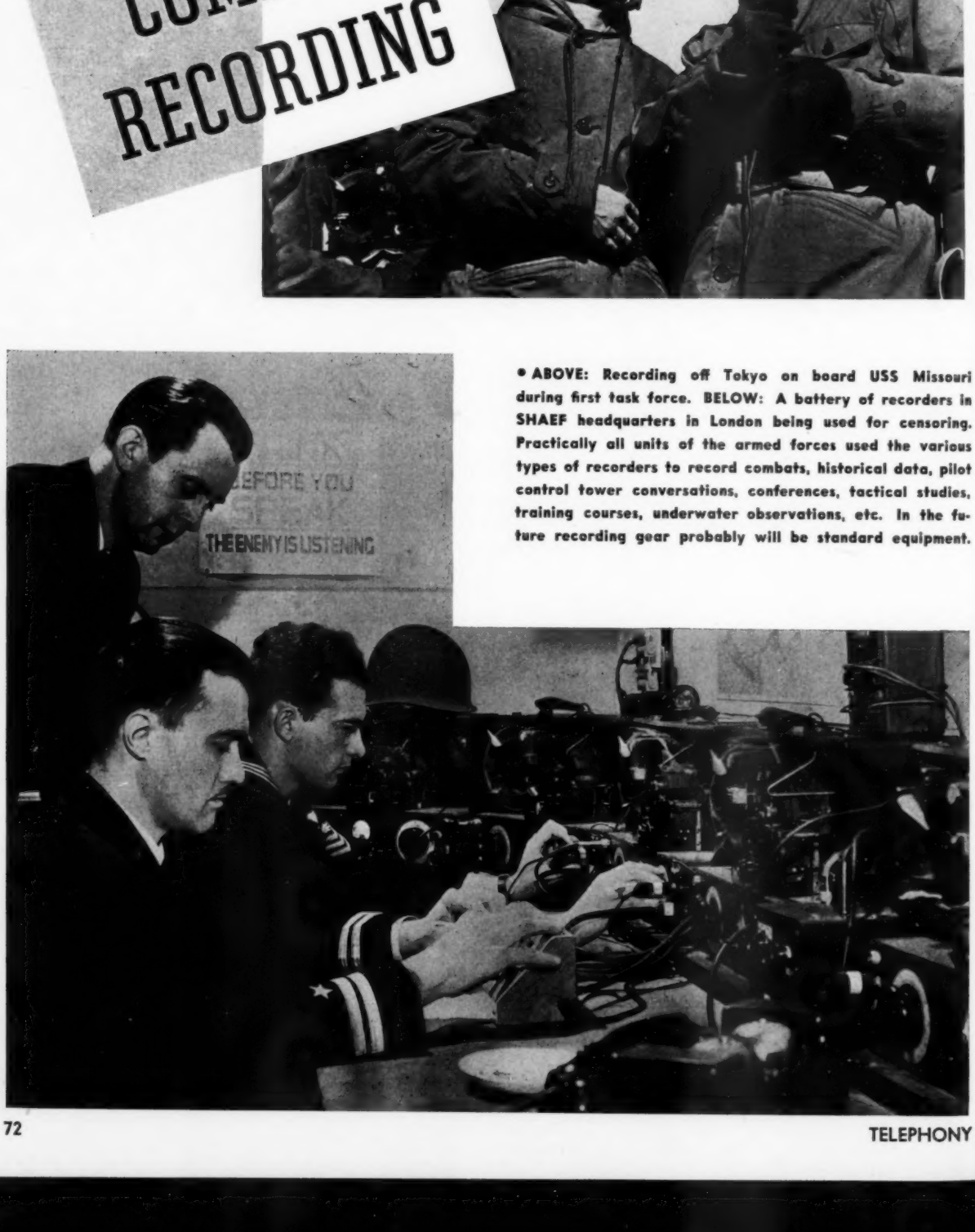
SOURCE OF SUPPLY FOR THE BELL SYSTEM

Buy all the Victory Bonds you can— and keep them!

One of many giant presses which apply lead sheathing to the miles of telephone cable needed by the Bell System.

In our factories, thousands of men and women are building complicated central office equipments with all possible speed.

COMBAT RECORDING



• ABOVE: Recording off Tokyo on board USS Missouri during first task force. BELOW: A battery of recorders in SHAEF headquarters in London being used for censoring. Practically all units of the armed forces used the various types of recorders to record combats, historical data, pilot control tower conversations, conferences, tactical studies, training courses, underwater observations, etc. In the future recording gear probably will be standard equipment.

THE outbreak of World War II in Europe found the sound-recording industry still thinking in terms of commercial adaptations, such as dictation, home recording and musical transcriptions. Gradually certain agencies of our government, prior to our entry into the war, became interested in recording—the first group being those concerned with law enforcement, anti-espionage and sabotage.

The recording industry, through the medium of research and development, began to give consideration to the task at hand and started to develop combat equipment for use under extreme adverse conditions. This was not easy, as prior to this time, it was not even possible to lean against a table while the recording was going on for fear that the recording head would be jostled and the recording spoiled. It, therefore, became necessary that certain recorders had to be built that could record under gunfire, roll and pitch of a ship, bouncing of a jeep or tank, and still not damage the recording stylus, and furthermore not interfere with the intelligibility of the recording. The result was that various forms of recorders began to appear.

Those most frequently employed were disk recorders, wire recorders, acetate sleeve recorders and acetate film recorders. All of these recorders fulfilled various ranges of purposes, among which were the briefing of pilots' telephone recordings, narrative recordings which were filed in the archives for future generations to hear and study, recordings within airplanes, recording in control towers, conference recordings, combat recordings at the scene of action for later transcription on radio networks for the benefit of the public, censorship surveillance, tactical study, training purposes, underwater sound observations, monitoring and reference recordings, both land-based and in mobile equipment.

The Navy became interested in the many angles of sound-recording and began to make a study of the best type of equipment available for subscribed purposes. For the short briefing of pilots returning from missions, the disk medium was selected. For airborne recording, small wire units were selected. For narrative and combat recordings, the film recorders were selected. The majority of the historical records of the Navy have been compiled on film recordings since the outbreak of the war and filed in the archives of that department.

With the approach of D-day in Europe, the Navy selected the film recorders as the medium to be employed for recording and relaying to the American public the eyewitness accounts of the invasion. The Navy next began to build up its facilities at Pearl Harbor and Guam, in which various types of sound recording gear were employed for the monitoring of the station facilities.

The Marine Corps, for its combat recording in the field, used film, wire and disk units with equally good results.

The recording industry, as a whole, feels that the armed forces of the United States in the postwar era will find it almost compulsory to take recording gear into their consideration as standard equipment, for, in the intelligent use of recording equipment the human element with respect to error is almost entirely eliminated and the record will always speak for itself in correcting the mistakes that ofttimes are incurred in the excitement of intense action.

There are several new models being developed by various companies at the present time, built in accordance with the requirements of the armed forces to meet specific conditions. Some of these developments are extremely interesting and represent a great advancement in over-all efficient and foolproof operation, and, with all this, the recording industry is still in its infancy. The coming years should see the accomplishment of many new revolutionary phases, which will be the result of intense research and development as at present underway in the entire industry.

● Marine radio correspondent and four Minnesota marines somewhere in Pacific, record Christmas greetings to send to their families at home.

● ABOVE: Marine Corps correspondent records interviews with marines on Guam. BELOW: S/SGT. CHARLES O. SANDRUM, Dallas, Tex., at microphone, reads a letter to his parents with musical background.

Communications In "Old" Corps

(Concluded from page 27)

ability at solving problems arising from his daily work and at handling and training his subordinates. A candidate for promotion to the highest pay grade was required to have advanced training in both radio and wire; he had to be credited with satisfactory completion, therefore, of the technical courses of at least two advanced schools. In 1934 an advanced telephone electricians' school was established at Marine Barracks, Quantico, Va. There a six months' course of instruction was given in mathematics, advanced electricity and telephone construction, including cable splicing, open wire construction, field and fixed base telephone plant installation, trouble shooting and the repair of telephone equipment, together with many sub-courses relating to all of these subjects. It was no dunce who completed that school successfully.

Notwithstanding all that an expert telephone man has to know, it has always been a policy of the Marine Corps to select the best of the recruits who volunteer for communication duty, those men whose educational, mental and physical qualifications are outstanding, but who express no preference for either radio or wire work, for elementary training in radio. These men are screened again after completing eight weeks of training in electrical and radio practice, and those whose ability to master International Morse Code or to perform other duties of a radio operator is then considered insufficient, are transferred to wire duty.

On the other hand, men who express a definite preference are allowed to concentrate on the branch of communication of their selection. Many choose wire. The choice, however, is only for the purposes of concentration in study, since all communication personnel is required to have elementary knowledge of both radio and wire in order to permit the Fleet Marine Force to fulfill its functions. At any time a man who has concentrated in radio may become a wire man or vice versa, although he will not necessarily be sent to a second school if he has already completed one. That way communication personnel was fitted to hold responsible offices.

During the Japanese attack on Pearl Harbor, wire installations suffered surprisingly little damage. Afterwards, however, all communication facilities on the island of Oahu were greatly increased to accommodate the multitude of activities that were rushed to the scene. Most of these were temporary, but many of them have been replaced by permanent installations, now that Oahu has recovered from its dislocation.

On the battlefields of the Pacific, employment of wire communication has reached astounding proportions. The early maneuvers of fleet force training used wire relatively sparingly, less than half a dozen circuits then being considered necessary for use by an infantry battalion. Gradually the demand for telephones has increased, and at least a dozen circuits per battalion are now provided. Field wire construction along trails and roads has become so crowded that, without the utmost care being exercised by all concerned, it quickly degenerates into an unmanageable tangle.

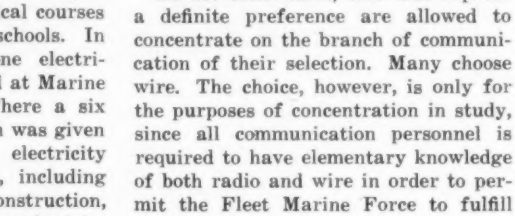
Wise communication officers have long known that it was good policy to have a telephone wherever the commanding officer happened to be. The CO, however, used to be thought of only in the singular, and his whereabouts was usually in the command post. Nowadays the theory of staff command is exercised at all levels of military organization. Staff officers are avid users of the telephone and, being plural, they turn up in embarrassingly unexpected places. That has vastly complicated the communication problem.

Communication equipment, itself, has become exceedingly complicated and includes, in addition to such intricate items as carrier frequency telephone equipment that is often further involved by using it with radio links, a staggering assortment of radio sets required to handle traffic on the many different networks necessary to an amphibious operation. In alleviation of these complications, much signal gear is belatedly being redesigned with emphasis on reducing its weight and bulk.

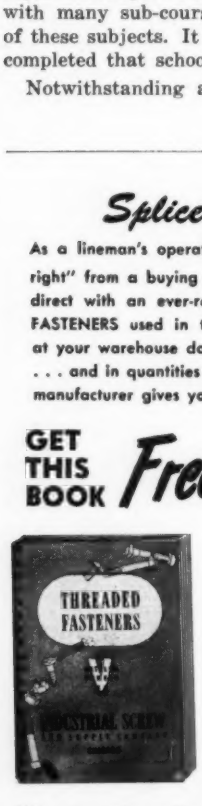
Looking back at what used to be done, present-day methods, in comparison with the ways of the "old" Marine Corps, appear enlarged as though under a magnifying glass. The Japanese Empire, however, is a foe somewhat more formidable than Latin American insurrectos or Chinese bandits, and every aspect of warfare has expanded in recognition of that fact. Communications in the "old" Marine Corps were good, but they are bigger and better now.

Splice INTO THIS Screw CONNECTION!

As a lineman's operation, that may be all wrong. But it's "righter than right" from a buying angle. And here's the reason why! It connects you direct with an ever-ready source for SCREWS, NUTS, BOLTS and other FASTENERS used in the telephone plant department. It virtually places at your warehouse door, hundreds of threaded parts in thousands of sizes . . . and in quantities from a gross to a car. Buying straight from a manufacturer gives you many self-evident advantages.



GET THIS BOOK Free!



OUR 104 PAGE CATALOG

is cased in a tough, flexible cover; spiral bound to lay flat. There's a big, clear, quick-reference index in front . . . a 3 page itemized cross section index in back. Figures and reading matter are in large, easy to read "no squint" type. List prices are complete. Accompanying schedule shows discounts. The value of this book lies not only in its convenience as a buying guide; the reference section carries a whole lorry load of helpful data on Screw Threads, Screw Thread Definitions, Packing Weights, Dimensions of Standard Screws and bolts, Wire Gauges, Plating, etc.

When you write us for quotations just add a note asking for this comprehensive Buying Guide and Hand-Book of Fasteners . . . or jot down your request on your company letter-head and shoot it in! You'll have the catalog "pronto."

INDUSTRIAL SCREW COMPANY

Manufacturers of Special and Standard Screw Products

176 NO. UNION AVENUE CHICAGO 6, ILLINOIS

Coast Guard Communications

(Continued from page 29)

the cable. In moving such circuits back onto terrain not subject to damage by storm, heavy beach grass, underbrush, and sometimes heavy timber were encountered. Experience showed that tufts of the tough beach grass would penetrate and grow through the rubber jacket of the cable and eventually ground out the circuits. Where heavy underbrush was encountered special rooter plows drawn by heavy tractors were required to clear the ground for the standard cable laying plows.

Then there was the gopher problem, and Capt. E. W. Webster, USCG, chief communications officer for the Coast Guard, or his assistant, Lieut. Comdr. H. E. Roward, USCG, officer-in-charge of the landlines section, could relate the difficulties experienced by the rodents' underground burrowing. Probably because the cable laying plow had made the progress easier, the gophers inevitably would burrow along the path of the cable. When the cable obstructed their path they would gnaw through it. Service would be disrupted.

In some localities where the cable was laid through dunes of dry sand, heavy static charges would build up. Their effect on the rubber sheath was approximately the same that electrolysis has on lead sheathed cables. Small pitted places formed and rapidly deepened, causing eventual failure of the cable. As the result of these experiences, it became necessary to renew much of the cable at frequent intervals.

Through it all the Coast Guard found itself confronted with an acute rubber shortage. The answer to this problem was found in plastics. At the same time, use of plastics eliminated much of the static trouble described above, since the plastic was less susceptible to static cutting.

At some locations, rocky beaches and headlands, great piles of driftwood or rocks, or dense timber growing close to the surf line made it impossible to bury the cable. Whenever possible, light pole lines or wire strung on trees similar to forest type of construction was substituted. Where no type of landwire could be laid or strung, the patrolmen were equipped with walkie-talkies. There could be no loopholes.

The second phase of the Coast Guard's problem—that of providing communications between the local beach

Users say

"DIVERTER • POLE CHARGERS PROLONG BATTERY LIFE"

Recently, we asked a few of the long-time users* of E.P. Diverter-Pole Motor-Generators, "What do you consider to be the effect of the 'Diverter-Pole' on Battery Life?"

...Here are the answers:

USER	ANSWER	DIVERTER-POLE INSTALLED
A	"It has prolonged the life of one battery by at least five years."	1932
B	"If operated correctly, should give long battery life."	1931
C	"Excellent—our present battery is 16 years old and apparently in good condition."	1929
D	"We feel that the battery life is considerably extended."	1925
E	"Our first control batteries lasted 14 years."	1928
F	"Good, if used as float charge."	1926
G	"Greatly prolongs life."	1928

For the most reliable, maintenance-free and efficient source of direct current, specify Diverter-Pole Motor-Generators.

*Names on request

WRITE FOR BULLETIN 96-A

X-7

EP

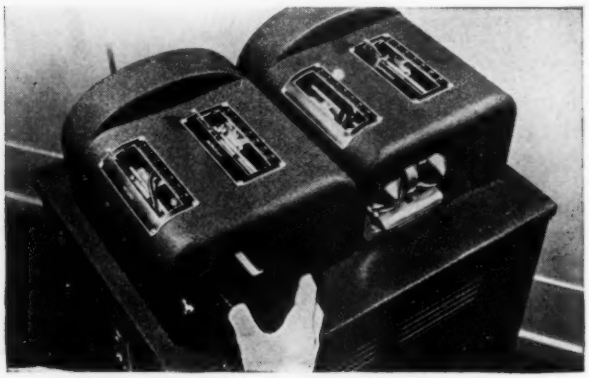
THE ELECTRIC PRODUCTS COMPANY

1727 CLARKSTONE ROAD CLEVELAND 12, OHIO

Time-proved Equipment
for varied recording needs

Tested and proved during rigorous wartime use, Dictaphone Electronic recording and dictating equipment is today serving a multitude of special uses—from office dictation to recording of phone conversations, from logging air traffic to monitoring fire alarms.

All Dictaphone equipment employs recording mediums, which provide constant groove speed and insure equally high quality of reproduction from all parts of the record, without the use of a compensating mechanism. It permits instant stopping and starting, and is naturally adapted for listening back and for visible indications of corrections and instructions.



THE DICTAPHONE BELT RECORDING MACHINE (shown above) uses a flexible cylindrical belt which is designed especially for permanent one-time recordings and which may be easily filed, or mailed without danger of breakage.

THE CYLINDER-TYPE DICTAPHONE RECORDING UNITS are designed particularly for transcription applications, employing the same rigid cylinder proved so successful with Dictaphone Dictating Equipment.

Write us for full information. Whether for training purposes, logging operations or other uses our engineers stand ready to help you with your recording problems. DICTAPHONE CORPORATION, 420 Lexington Avenue, New York 17, N. Y.

DICTAPHONE
DICTATING AND RECORDING EQUIPMENT

The word DICTAPHONE is the registered trade-mark of Dictaphone Corporation, makers of Acoustic and Electronic dictating machines and other sound recording and reproducing equipment bearing said trade-mark.

B-L METALLIC RECTIFIERS

SELENIUM — COPPER SULPHIDE

offer you these advantages:

They are COMPACT . . . SILENT . . . DEPENDABLE . . . TROUBLE-FREE . . . RUGGED . . . and

They are ADAPTABLE for power outputs from Milliwatts to Kilowatts.

Many rectifier applications, heretofore considered impractical, have been devised by B-L Engineers. It is more than likely that they can be of assistance in solving your problems of converting AC current to DC . . . Write for Bulletin R38-d.

THE BENWOOD-LINZE COMPANY

1815 LOCUST STREET • ST. LOUIS 3, MO.

Long distance telephone CEntral 5830

ELIMINATE
REPLACEMENT COSTS
USE UNBREAKABLE INSULATORS

Purchase direct or through your jobber.

$9.35 PER HUNDRED F.O.B. CHICAGO

COMMUNICATION EQUIPMENT & ENGINEERING CO.

504 North Parkside Avenue • Chicago, Illinois

patrol stations and military centers—involved separate studies. In many cases, circuits of considerable length were required.

Wherever the stations were located close to existing coastal lines previously in Coast Guard use, these lines were extended to connect with the new beach patrol posts. Where the beach patrol units were located in areas not formerly served by the existing Coast Guard network, commercial telephone service was obtained wherever possible. But there still remain areas which were not reached either by existing Coast Guard facilities or by commercial lines. Necessity of the moment made it imperative to build pole lines, lay submarine cables or resort to radio.

Some of these lines were constructed with great difficulty. Certain sections of the coast, particularly in the Pacific northwest, were densely wooded, with no existing Coast Guard or commercial facilities within miles of isolated units.

The length of the circuits demanded construction which would result in high grade transmission. To accomplish the task here, the Coast Guard enlisted trained lumbermen who went to work in cutting rights-of-way through dense spruce and hemlock growth. Many of the trees felled in this work were 10 to 14 ft. in diameter and rose 150 to 200 ft.

In many localities the coast consisted of a more or less continuous chain of islands, and here the Coast Guard procured and laid many miles of submarine cable. Through heavy surfs, over mud flats, through bayous-terrain that is neither land nor water, coast guardmen bent their backs to the task.

Where it was impossible to push wire to particularly isolated units within permissible time limits, beach patrol units were joined by voice radio circuits.

Finally, the job had been completed, and coast guardsmen walking their lonely watches at night could make periodic calls from each patrol post. Thus, the integrity of the watch could be checked, and, at the same time, the operating condition of the circuits was always known. Special repairmen were alerted at frequent intervals along the coast, and any troubles were quickly eliminated. At the station end of the circuits an operator was on duty to check the movements of the patrolman, and whenever there was a suspicious incident, word was quickly relayed to control centers. Here telephone and teletype circuits were ready for instant use in transmitting word of alarm to various military units.

Thus, the story of the beach patrol and its versatile communications sys-

BRIGHTER, STRONGER TOO . . . . Tungsten gives a high initial surge—lights up quicker than any other type of filament—needs only 1/5th second to bring cold resistance up to hot resistance value. That's *one* good reason switchboard operators prefer Sylvania Tungsten Telephone Lamps—*they're faster!*

And here are *two more* good reasons: they're brighter . . . because light is whiter, yet never too intense—they're stronger . . . these lamps have a rated average laboratory life of 1,500 hours. Sylvania Tungsten Telephone Switchboard Lamps fit standard sockets and can be used in any type of switchboard. Available now in clear. Natural ruby and natural green will be available soon.

SYLVANIA ELECTRIC

SALEM, MASSACHUSETTS

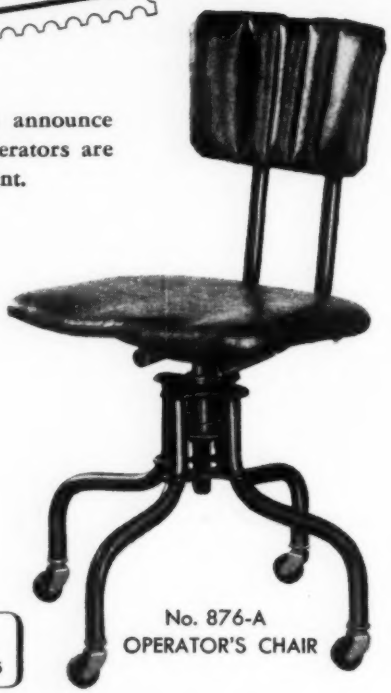
MAKERS OF FLUORESCENT LAMPS, FIXTURES, ACCESSORIES; ELECTRIC LIGHT BULBS; RADIO TUBES; CATHODE RAY TUBES; ELECTRONIC DEVICES

LOW CHAIRS FOR OPERATORS

NOW AVAILABLE

Stromberg-Carlson is happy to announce that Sturgis Low Chairs for Operators are now available for prompt shipment.

The No. 876-A has an adjustable seat height from 17 to 21 inches. The back support can be adjusted easily and quickly without tools or special keys. A choice of either genuine or imitation leather upholstery is offered. The seat is 15¼" x 16¾" with full saddle. The frame is of 1" tubular steel with all joints welded.



No. 876-A
OPERATOR'S CHAIR

STURGIS POSTURE CHAIRS

No. 435-A

STANDARD CHAIRS ALSO AVAILABLE

Prompt shipments are offered on standard Sturgis Operator's Chairs in the following seat heights:

18-22" with footrest 5" from floor
20-24" with footrest 6" from floor
22-26" with footrest 8" from floor
24-28" with footrest 10" from floor
26-30" with footrest 12" from floor
28-32" with footrest 13" from floor

Order Your Sturgis Operator's Chairs Now from the Exclusive Distributor

STROMBERG-CARLSON

STROMBERG-CARLSON
PROGRESS IN TELEPHONY

STROMBERG-CARLSON
Factory, General Offices: Rochester 3, N. Y.
Branch Offices: Chicago 6, Kansas City 8, San Francisco 3
In Canada: Stromberg-Carlson Company Limited, Toronto

tem was evolved, to function quietly and efficiently until the course of the war had so altered that no longer was there danger of enemy landings.

While some of the beach patrol circuits were evidently only immediate communications measures to meet a very specific need, it has now been determined that many of the longer connecting circuits will be of permanent value in connection with air-sea rescue activities, in which the Coast Guard now plays a leading role. Lines once poised for possible use in relaying word of enemy landings now will be in readiness to flash word of a disaster at sea, to bring into action the varied rescue activities the Coast Guard will continue to maintain. Then, as in war, the Coast Guard will depend greatly on its telephone communications.

Seabee Sidelights

(Continued from page 32)

door bell buzzer made a satisfactory common signal; and a 10-ft. length of cable, stripped, furnished wire for the forms.

The completed set, built solely from these leftovers and discards, with the exception of the batteries, measured 13 ins. x 20 ins. x 38 ins., had 75 keys, operated with 12 extensions, and was tied to three main line trunks.

As additional miles of field wire were added and telex lines laid under the water of a nearby bay, the Seabees' improvised communication system was extended to include the entire base, including Army and Navy as well as their own encampments. It eventually served 25 local battery talking, common battery signalling, and magneto signalling stations over an area that covered many miles.

* * *

A chief electrician's mate in charge of a seabee detail stringing telephone wires on Tulagi suddenly found his men uneasily staring up into a tree, making no attempt to take the wire up.

Lying at full length on one of the lower branches was a three-foot giant lizard of terrifying appearance. Everyone looked expectantly at the chief.

Quelling a prickly sensation, the chief fastened two climbing belts together to encircle the huge trunk of the tree, buckled on his climbing hooks and started up.

The lizard kept ahead of him, but

A Financing Service
for
Independent Telephone Companies

We are in a position to assist a number of Independent telephone companies, including small companies, in financing postwar rehabilitation of plant, conversion of equipment, or additions or improvements.

Terms will be in keeping with prevailing interest rates and costs, will depend to some extent upon the size of the loan, and will in all cases give due regard to the ability of the borrowing company to meet its obligations without strain on its operations or impairment of present ownership of the business.

On the above basis we can arrange a substantial number of loans or other financing deals of considerable size, and many small loans. Inquiries will be kept confidential.

YORK INVESTMENT COMPANY

(A Wholly-Owned Subsidiary of Theodore Gary And Company)

Head Office: 1100 King Street, Wilmington 33, Delaware

AVAILABLE SOON

COFFING HOISTS and Utility Maintenance Tools

Will soon again be available to the Telephone trade and other lines of industry. After almost four years of day and night production for the Armed Forces we are now in position to accept and schedule your orders. We are proud of the production record we have made and of the important part COFFING products played in helping to restore Peace on Earth. Our standard line of hoists were used by our fighting men so there is no reconversion period for us.

WRITE FOR OUR NEW FOUR-PAGE FOLDER NO. Z-4.

COFFING HOIST COMPANY DANVILLE ILLINOIS U. S. A.

Tape on your hands?

....Not IF IT'S Jenkins!

BECAUSE OF CONTROLLED processing, Jenkins Gold Seal Tape never sticks to your hands. It sticks to the job, however... like a leech. What's more, it doesn't dry out, peel, or ravel. In addition, it's cellophane-wrapped—and then boxed—therefore always factory-fresh. Made by the makers of Jenkins Diamond Seal Friction and Rubber Tapes, which meet A S T M and Federal specifications . . . Jenkins Bros., Rubber Division, 80 White Street, New York 13, N. Y.

JENKINS

Gold Seal Tape

FRICTION ... RUBBER

paused every four or five feet to turn around and inspect the chief—who also stopped, stared back, and then resumed climbing.

At 25 ft., the seabee quickly secured the wire and started down. For some reason, the lizard decided to descend, too!

"I don't know how fast I was going," said the seabee chief, "and the estimates of the others are gross exaggerations—but I do know I won!"

* * *

At a central Pacific base, a motor-driven automatic telephone ringing device was constructed by a navy seabee battalion's electricians to replace their old-style hand generators.

The unit was composed of a five-bar magneto, removed from a telephone subset, and coupled to a one-quarter horsepower AC motor. A switch starts and stops the motor, and a ringing key separates the ringing power from the operator's telephone circuit,

The battalion's switchboard was of the magneto type, while the island's main exchange had only common battery lines available for connection. So the seabees' officer-in-charge designed a tie line circuit to provide inter-exchange service.

* * *

Eight seabees of a maintenance unit stationed on a South Pacific island constructed and erected a 58-ft. signal tower in less than two weeks.

Constructed of 8 in. x 8 in. timbers, spliced into 58-ft. lengths, the tower was built on the ground in two sections, and raised into place on concrete footings by use of a 30-ft. jib.

Marianas-based seabees hitched an American jeep to a Japanese plow and produced some of the straightest furrows this side of the Iowa corn belts—but the product they planted won't sprout anything but conversation. They were trenching to bury cable.

That was the way one telephone system was launched, according to Charles A. Roberts, 40-year-old electrician's mate, first class, USNR, of Sacramento, Calif., in charge of the communication crew.

But the Jap plow wasn't the only equipment salvaged. "If it weren't for some of the Jap stuff," the seabee said, "we'd barely be in business."

One of the richest finds in the telephone salvage hunt was a spool of Jap cable, the outer layer riddled by shrapnel and rifle fire. It produced 400 ft. of undamaged and sorely needed cable. Also found were two buried power lines, lead covered and armor protected, many Jap coils, switches, condensers and a Jap oxcart, which was converted into a reel-cart for wire and tools.

Underwater Wire Communications

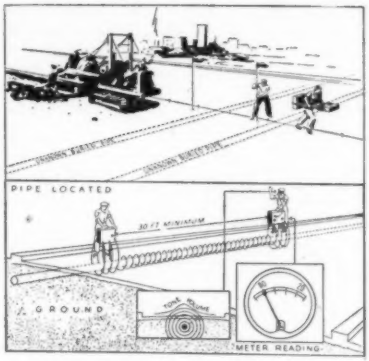
(Concluded from page 41)

heated properly and are watertight. Any doubtful splice should be remade. Heavy cables must be paid out from reels, mounted on an axle, but light ones such as "Spiral-4," can be coiled like a figure eight in the bottom of the boat and then paid out over a drum (DR-4) that operates as a sheave on a reel unit (RL-31), mounted in the stern of the boat. Timely manipulation of this gear produces enough slack to ease the strain on the cable of its own weight, but not enough to let the cable kink or foul itself in coils. Skillful handling of the vessel itself is the only means whereby cable can be safely lowered to a bottom that varies irregularly from a fathom or two to several hundred fathoms in depth.

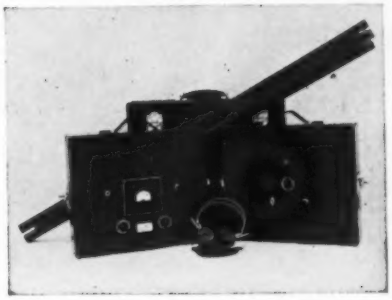
A critical moment in laying underwater installations comes at the shore end, where the line is to be landed. Generally, the line can be buried from a point beyond the breakers until it emerges at a safe distance above the shore. But sometimes it must be brought up from the bottom and carried overhead when traffic or other conditions on the beach made burial impractical. In that case a strong, improvised tower or other structure must be built and placed securely where it will do the most good (See *Fig. 4*). Often a wide coral shelf, adjoining the beach, prevents the boat from approaching shore. Then the cable must be landed by manpower, usually with the aid of ropes.

In any cable landing operation the exposed end of the cable must be closed very carefully and kept absolutely watertight. Most important of all is that the whole cable laying undertaking be done at extremely low speed even though, while under fire, that may be hard on the nerves. A hastily laid line is never laid well; it soon goes out of service, and it's a fact that the life of a line in warfare often will save the lives of its builders and their buddies. Marine communication personnel teaming up with navy or coast guard boat crews are well aware of that.

BURIED PIPE **M-SCOPE** CABLE FINDER



FREE 16-PAGE BOOKLET UPON REQUEST



The M-SCOPE consists of a specially designed radio Transmitter and Receiver, with conductive wire. In operation, the Transmitter sends out a continuous signal, and when there is no metal between Transmitter and Receiver, a definite volume of sound is heard in the Receiver earphones and the meter (mounted on Receiver) gives a definite reading. If a metal object lies between the two units, sound in earphones is louder and meter reading higher—and the pipe or other metal object is located.

An M-SCOPE Water Leak Detector is so "sensitive" that it can spot the exact trouble point even through concrete; so "speedy" that it can test from 275 to 300 hydrants in a single day; so "accurate" that it usually hits the trouble spot "right on the nose" and "always" within a circle two to three feet in diameter. City Water Superintendents and Army Engineers alike, these days realize the importance of conserving "water, pipe, fuel." The M-SCOPE Water Leak Detector helps you conserve all three.

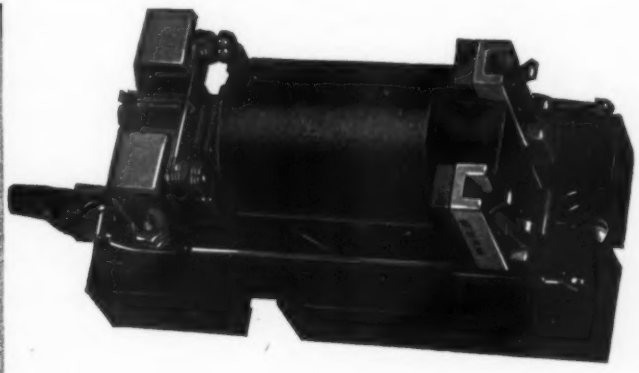
The M-SCOPE is solving—successfully—the varied problems involved in the development, operation and maintenance of buried pipe and cable systems and is in daily use by representative organizations in such important groups as:

- Government Projects
- Municipalities
- Sewerage and Water Plants
- Consulting Engineers
- Airports
- Public Utilities
- Industrial Plants
- Oil and Pipeline Companies

FISHER RESEARCH LABORATORY PALO ALTO, CALIFORNIA

FAHNESTOCK ELECTRIC COMPANY, INC.

Type 3-A Arrester Relay



SOLD BY

WESTERN RAILROAD SUPPLY COMPANY

2360 SOUTH ASHLAND AVENUE

CHICAGO 8, ILLINOIS

● For years there has been a definite need for the use of a protector of the type illustrated above. Its particular adaptation is on rural and toll lines where they parallel power lines for a considerable distance. Many REA lines are strung parallel with rural and toll lines throughout the country. Arrester Relay No. 3-A is the answer.

Communications In Action

(Concluded from page 48)

personnel, move up near the front line to direct fire from the highest point of land they can reach, bringing the guns to bear where they will do the advancing infantry the most good.

As soon as possible, heavy signal equipment is installed. The field telephone replaces the light, sound-powered telephone and heavy wire is substituted for the light combat wire which the men carry in 25-pound reels on their backs.

Signal repairmen now go to work. They collect equipment brought ashore by men who were casualties, and also collect apparatus which was damaged. These are repaired and redistributed as rapidly as possible.

As the operation progresses and higher echelons move in, expansion of facilities continues. Artillery communications soon develop to the point where an entire battalion of guns can be directed on a target in a matter of seconds.

When the objective is secured, the marine communicators give way to army or navy units and the leathernecks return to some established base to prepare for new landings to come.

The job of the signalmen is not easy. Their accomplishments under combat conditions have been amazing. On New Britain, radio contact between two landing units, 80 yards apart, and to all command posts was established within half an hour after the first assault team hit the beach. In this same operation, 400 radios, 75 switchboards and nearly 700 miles of wire were in use within 48 hours along an eight-mile front.

The problems met and overcome by communication men almost seem insurmountable. At Cape Gloucester, when a flash flood caused a river to rise 20 feet in nearly as many minutes, 16 out of 20 telephone lines in the command post were washed out and the operator sat on the switchboard to keep it from being swept away. He kept the remaining four lines in service while others quickly repaired the damaged circuits.

M/Sgt. Donald A. Hallman, a combat correspondent, wrote from New Britain: "Complete telephonic contact was established with all units within four hours—and maintained through rain, bombings and earthquakes."

The use of battlefield radio and telephone communication for blitz relay of messages, so decisive in island warfare, is illustrated in a dispatch about the Cape Gloucester battle by the same combat correspondent.

"Two Japanese rubber boats are seen battling surf on a reef 1,500 yards out. . . . An infantry company far down the coast gets the message. A patrol is waiting on the beach within five minutes. The Japs pull out to sea and are lost to sight.

"A mortar unit supporting a badly mauled infantry line had run out of ammunition. It called for more. Within three minutes from the time the message was sent, an amphibious tractor was being loaded at a beach dump.

"Marines had stormed zero point near the Japanese-held fighter strip. Fifty pillboxes had been knocked out by tanks, but still there were plenty of Japs in the woods ahead. Planes were requested to strafe them. The word was received on New Guinea airfields in a matter of minutes."

These are some of the vital uses of radio and telephone.

MAKING DIRECTORY ADVERTISING PAY...

TWENTY-ONE years' experience and the sale and management of more than 26 million dollars worth of advertising have given LOOMIS the "KNOW-HOW" to produce greater revenue from Directory Advertising.

We invite you to get the LOOMIS story before your advertising contract comes up for renewal. Address Roland T. Beard, 502 Gettle Bldg., Ft. Wayne, Indiana, or Wesley H. Loomis Jr., Pres., 20 W. 9th Street Bldg., Kansas City 6, Missouri.

Loomis ADVERTISING COMPANY

502 Gettle Bldg., Ft. Wayne 2, Ind.

506 Olive St., St. Louis 1, Mo. ★ 20 West 9th St. Bldg., Kansas City 6, Mo.
6908 Market St., Upper Darby (Phila.) Pa. ★ Omaha Nat'l Bank Bldg., Omaha 2, Neb.

RARIN' TO GO!

Conditioned by four hard fighting years, U. S. Wires and Cables are back in civilian gear.

Tough and reliable as they were at the start, they're even tougher and more reliable today.

The war experience proved the most valuable in all our wire-making history. Unpredictable developments in fighting methods demanded changes in almost every type of wire and cable.

This was particularly true in the field of Communications, where U. S. Wires and Cables were widely used by the Signal Corps, Ordnance, Corps of Engineers and the Navy.

U. S. Rubber now brings all this advanced technical knowledge thus gained to the service of commercial communications. The Telephone Engineer is offered a greatly expanded line covering every need—new U. S. Wires and Cables of higher efficiency under all conditions.

U. S. ELECTRICAL WIRES AND CABLES

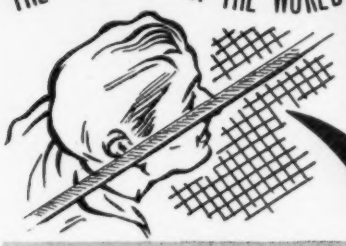
Serving Through Science

Listen to "Science Looks Forward"—new series of talks by the great scientists of America—on the Philharmonic-Symphony Program. CBS network, Sunday afternoon, 3:00 to 4:30 E.S.T.

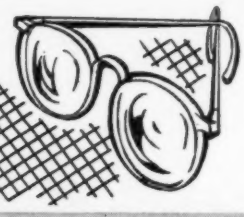
UNITED STATES RUBBER COMPANY

1230 AVENUE OF THE AMERICAS • ROCKEFELLER CENTER • NEW YORK 20, N. Y.

THE BEST EYES IN THE WORLD



THE BEST GLASSES EVER MADE



. . . are not good enough to detect tension and sag to TODAY'S standards!

Be CERTAIN with a Dillon DYNAMOMETER

Quickly gives you exact readings. Takes out all guessing. SAVES TIME. Saves maintenance. Up-to-the-minute telephone men are using Dillon Dynamometers for guys, conductor, strand or high tension wire. Large easily read figures in pounds, instantly read. No charts. No figuring. Compact, easily carried. Nine capacities for 500 to 20,000 lbs., all same size.

Wire, write or phone for illustrated folder with full details

Weight; 8 lbs., 4 oz. Size 8¼" x 6¼" x 3". Not injured by overload. Strong construction cased for all weathers

W. C. DILLON & CO. Inc.

5422 W. Harrison St., Chicago, Ill.

LINEN LACING TWINE

Once your employees have used Armature Brand Linen Lacing twine they will accept no substitute. The Linen fibre insures lasting qualities and its added strength keeps costly breaks at a minimum. Manufactured in various sizes to meet your exacting requirements.

EDERER, INC.

PHILADELPHIA 24, PA.

H. S. Clark & Son, Chicago 6 — F. J. Fawcett Inc., Boston 11 — Hayne-Surridge Co., St. Louis 3 — H. H. Kemper Co., Cincinnati 2

Field Artillery Communications

(Concluded from page 57)

The nerve center of the field artillery units is the Fire Direction Center (FDC) of each command echelon. Numerous pieces of communication equipment keep these vital nerve centers informed of the progress of the battle. The wire system with the many telephones, switchboards and related equipment, remains the backbone of artillery communications. Long ago the artilleryman learned that speed in communications is essential, and he has learned that his wire lines must be put in quickly and kept in operation. Although the wire lines are the backbone of his communication system, the artilleryman also strives to parallel these lines with other means of communication. Targets that the Forward Observer (FO) sees cannot be taken under fire if he is unable to transmit the location of these targets to the firing guns. The FO keeps his battalion informed of the progress of the infantry and quickly adjusts fire on any point that may hold up the continuous advance.

To establish this system, wire must be laid by hand, by jeep, by truck and sometimes even by plane. Always it must be put in and kept in. The wire crews often work alone in areas which have not been entirely cleared of the enemy. Their job requires long hours of hard work, and in many cases it seems a thankless job. It sometimes is hard for these wire crews to feel that they are directly affecting the outcome of the battle. However, after a short time in combat, not only the wire crews but the other troops as well soon realize their worth and hardship.

It is believed, however, that sometimes we all forget the men behind the scene who have given so much time and effort in the development and production of this vital equipment. The marines salute the producers, engineers and workmen in the many plants, who supply us with such excellent communication equipment.

Cable a Water Pipe?

After finding a telephone cable cut and a bucket placed under it, men in the U. S. Signal Corps in India learned that because the cable resembled a pipe the hopeful natives had expected water to gush from it.

For
CABLE SPLICING
We Suggest
DRIERITE DESICCANT

DRIERITE DESICCANT absorbs water by Chemical Action and its performance is not limited to absorbing moisture "by physical means alone."

DRIERITE DESICCANT maintains the extremely dry condition corresponding to the dew-point of minus 110° F. This high drying efficiency cannot be obtained by a substance which absorbs moisture "by physical means alone."

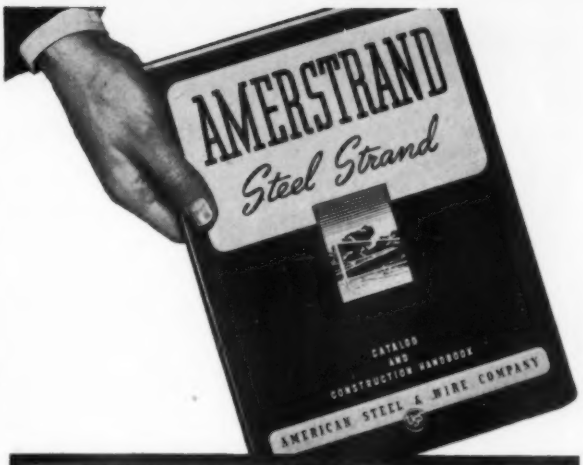
DRIERITE DESICCANT absorbs and holds moisture notwithstanding temperature rise; physical absorbents release absorbed moisture if the temperature of the splice is raised.

DRIERITE DESICCANT is the most efficient drying agent available for cable splicing; and is furnished to all users under our established price schedule.

STANDARD PACKAGES

1/8 Pint Can (50 grams) 48 per Carton
1/2 Pint Can (200 grams) 12 per Carton
1 Quart Can (800 grams) 12 per Carton

W. A. HAMMOND DRIERITE COMPANY
XENIA, OHIO



A Free Book *for You*

Contains complete, authoritative information on Steel Strand, for engineers, construction and maintenance men.

THIS handbook concerns the application of U·S·S Amerstrand Steel Strand as overhead ground or "static" wire, as guy wire and as messenger wire in overhead transmission, distribution and communication lines. It also includes complete data and descriptive material on the various constructions and grades of Amerstrand Steel Strand, which with its companion product, Amertel Telephone and Telegraph Wire, is well and favorably known to many operators of outdoor plants.

The many practical chapters—such as Physical Properties, Standard Lengths, Anchors, Loading Map and Table, Sag and Tension Curves—make this ready reference book a treasure chest of informative, helpful data, an invaluable guide to efficient and economical buying.

Just fill in and mail the convenient coupon and your *free* copy will be forwarded promptly.

American Steel & Wire Company
Cleveland, Chicago and New York
Columbia Steel Company, San Francisco, *Pacific Coast Distributors*
United States Steel Export Company, New York

UNITED STATES STEEL

These tags are placed for your protection on every coil of AMERTEL Telephone and Telegraph Wire and AMERSTRAND Steel Strand. They are your assurance of highest quality.

EVERY SUNDAY EVENING, United States Steel presents *The Theatre Guild on the Air*, American Broadcasting Company coast-to-coast network. Consult your newspaper for time and station.

MAIL THIS COUPON TODAY

American Steel & Wire Company
440 Rockefeller Building,
Cleveland 13, Ohio
Please send me a free copy of your Amerstrand Handbook.

Name..... Title.....
Company.....
Address.....
City..... State.....

American Beauty

ELECTRIC SOLDERING IRONS

are sturdily built for the hard usage of industrial service. Have plug type tips and are constructed on the unit system with each vital part, such as heating element, easily removable and replaceable. In 5 sizes, from 50 watts to 550 watts.

TEMPERATURE REGULATING STAND

This is a thermostatically controlled device for the regulation of the temperature of an electric soldering iron. When placed on and connected to this stand, iron may be maintained at working temperature or through adjustment on bottom of stand at low or warm temperatures.

For further information or descriptive literature, write

107-1

AMERICAN ELECTRICAL HEATER COMPANY

DETROIT 2, MICH., U. S. A.

Native Timber In Pacific

(Concluded from page 43)

Toward both the Tropic of Capricorn and the Tropic of Cancer, but still within the Torrid Zone, there is bamboo. Bamboo has obvious faults when viewed as pole material. Its diameter seldom reaches six inches and it's hollow (a factor which invites termite trouble and exacts the use of special hardware). Above all, it's extremely flexible. It's whippy as a hack-saw blade, but it's light, and it's tough, though it won't last longer than a year at best, and very likely will collapse (from termite action) within six months.

So far, unless it be in the Philippines, no extensive warfare has taken place in bamboo country, and the effect of battle has not yet been recorded on a bamboo grove. Probably it's even more disastrous than among the coconuts. In any case, like coconut palms, bamboo is generally a cultivated plant, highly valued by its owner; it's hard to make him part with it and, unlike palms, it's comparatively scarce. Bamboo is hard to climb and hard to prepare, but it is usually found in reasonably accessible places and it's easy to cut. Its lightness recommends it. Rather than struggle with other native poles, and in spite of its shortcomings, bamboo is often worth considering.

Fortunately, the shipping situation improved enough to permit the transportation of a few American telephone poles, as well as piling, to the far Pacific. It's no coincidence, however, that this happy situation arrives at a time when largely treeless lands are expected to be the battlegrounds of the immediate future. As the Japanese power fades, so does the use of native timber poles; and the desirability of the last is second only to that of the destruction of Dai Nippon!

Bell Contributes

One outstanding weapon of this war is the rocket, now used by our fighting forces on land and sea and in the air. Scientists at Bell Telephone Laboratories had an important part in the technical development of this American weapon. One of their contributions was the "ribbon frame" camera which takes 120 pictures a second on a continuously moving film.

REPRINTS

here is ready-made good will—available to you without charge

This advertisement, in poster-reprint form, can easily be mounted inside pay station booths with a bit of cellophane tape.

It will reach people who are potential subscribers. It will help present subscribers appreciate your company.

This is the second of a series. Start now to put it to work. Just tell us how many you can use.

THE GRAY MANUFACTURING COMPANY

W. E. DITMARS, President

16 ARBOR STREET, HARTFORD 6, CONN.
230 PARK AVENUE, NEW YORK 17, N. Y.

Authorized Agents: Kellogg Switchboard & Supply Company • Graybar Electric Company Stromberg-Carlson Company • Automatic Electric Sales Corp. • The North Electric Mfg. Co. Leich Sales Corporation • Northern Electric Co., Ltd. • Automatic Electric (Canada), Ltd.

HAPPINESS COLLECT-

"Hello?"
"Mrs. Theodore Casey?"
"Yes."
"I have a collect call from Theodore Casey in San Francisco. Will you accept the charges?"

WILL SHE ACCEPT THE CHARGES?! Will she accept a moment of heaven on earth? Will she accept word from Ted's own lips—that he's home at last?

With a nickel in change and four minutes to train time, Ted slipped into a pay telephone booth and talked to Ruth, halfway across the continent. The prompt, friendly service he received from the busy Telephone Companies that joined in routing his call was helped in some measure by the rugged, efficient pay station he used.

Telephone pay stations are as much a part of the American way of life as the nickel itself. All things to all men, they offer pleasure, help in time of need, quick contacts across the nation. Telephone pay stations were originated and are made by The Gray Manufacturing Company, Hartford, Connecticut.

ALWAYS

WITH

SUB-CYCLE

You Get Tops In

RINGING SERVICE

HAS MANY EXCLUSIVE FEATURES

- No Moving Parts
- Nothing to Adjust
- Quiet Operation
- No Radio Interference
- Six Models for loads from small PBX to Large Central Offices.

More and more Sub-Cycle users are finding that it is "TOPS" as a powerful, dependable ringing converter. Through years of service, Sub-Cycle has proven its "Heavy Duty" ability to withstand the strain of the severest operating conditions. Priced low enough to be within reach of the smallest exchange.

ALSO PULSATORS

Sold By Leading Distributors

LORAIN PRODUCTS CORPORATION

LORAIN, OHIO

CLEARS TROUBLE IN A HURRY

Averages $6.00 Saving Per Fault

This easy-to-use Wheatstone Bridge puts its finger on faults — locates grounds, crosses or opens — enables trouble-shooters to clear lines or cables in minimum time.

A recent survey among users indicates that this Test Set saves from 1 to 8 hours in locating faults, as compared with other methods. In terms of man-hour cost of trouble-shooting, it saves an average of $6.00 per fault. From this average figure, it appears that after locating 21 faults the instrument has saved enough to pay for itself. After its 21st location, this test set is actually earning money.

These savings, as well as the benefits of subscriber good-will are yours with the purchase of one of these Test Sets. Price is $125.00. If more information is required, write for Catalog E-53-441(1).

A FREE HANDBOOK explaining methods of using this Bridge for locating grounds, crosses, opens and other faults, will be sent on request. Write for Note Book E-53-441 "Notes on Fault Location in Cables."

5430-A Type U Test Set

LEEDS & NORTHRUP COMPANY, 4901 STENTON AVE., PHILA. 44, PA.

LEEDS & NORTHRUP

MEASURING INSTRUMENTS · TELEMETERS · AUTOMATIC CONTROLS · HEAT-TREATING FURNACES

Jrl. Ad. E-53-441(4a)

Telephone Lessons On Bougainville

(Continued from page 39)

failure of the whole campaign was undertaken. In the light of what happened to the early attempts at getting a cable to Puruata, it never should have been tried. But it emphasized the limitations of improvised underwater cables, and may have had a long range effect on later operations because it was carried out under the personal observation of some heavily be-starred gentlemen.

The plan was to lay a prefabricated, 20-pair cable of field wires from the west end of the beach straight out to sea for about 300 yards, and then make a right angle turn and head east, parallel to the beach, for two miles before taking another right angle turn and making for the beach again. The cable, of course, was to be weighted, and at each of the 90 degree turns it was to be marked with a buoy. The location of each beach crossing was selected carefully, opposite a big tree, so that the cable could be overheaded out of harm's way. Two log structures, similar to those used in the final crossing to Puruata, were made and placed about 150 ft. offshore, opposite those trees. Then the cable was coiled into a landing craft, figure-eightwise, and the operation began.

All went well. Overhead, across the beach to the top of the first pylon, where the cable was tied, was easy. Down the pylon to the sandy bottom, where a heavy anchor held the cable in place, was easy too. Then the boat stood out to sea, proceeding dead slow, while the cable was paid out by hand and weighted with steel pickets every four feet as it went over the stern. The first turn was reached and another anchor went overboard to fix the spot, while a buoy was floated over it. Then came the long, slow, two-mile haul down the beach. The second mile lay between the mainland and Puruata; it was alive with boats.

Just as the cable craft entered this busy channel, the be-starred gentlemen arrived in a Catalina flying boat, taxied up close, stepped aboard a snappy-looking barge that was waiting for them and to everyone's surprise, immediately came over to have a long and searching look at the cable-laying enterprise. That rather disconcerted all hands and it seriously complicated the already confused traffic conditions. Cer-

tainly the cable suffered. The water was only a couple of fathoms deep, therefore, the concentration of propellor washes on newly laid, not yet embedded picket anchors did some damage. The rest of the operation, however, was carried out unmolested and the cable was finally tied into the tree at the east end of the run.

By that time, the island still being blacked out, it was too dark to cut the new circuits into the old telephone system. That was done the next day. Of the 20 pairs in the cable, only five were in any way operative. And those five were found to be grounded so that they produced cross talk to the extent of being interchangeable. Even these went wholly dead an hour after they were connected. And that was the end of the cable.

Part of it was picked up for examination but none of it was found fit for salvage. The picket anchors had torn through much of the insulation and the heavy anchors at the turns had broken many conductors. The section where the inspection took place was the worst of all. There the picket anchors had chewed up the cable viciously and had snarled themselves in the line so that several were afoul of one another, wrapped in loops of cable, thus proving that plenty of slack was paid out.

These are some of the lessons that Bougainville taught. They seem to have been well learned because the reports of communications on Saipan, Tinian and Guam, on Peleliu, Iwo Jima and Okinawa have shown progressively improved results. The Japs thought they'd defeated America on a certain Sunday in 1941; they were wrong. It's just as wrong to suppose that Japan can be licked in a day. All the lessons of the war, therefore, won't teach America too much about what she has to do. May they hasten the deed, and may it be thorough!

"I'm going to build rural lines this way when I get home to Ma Bell."

STROMBERG-CARLSON
Recommends...

HEMINGRAY INSULATORS

Favorably Known Since 1870

Hemingray No. 43—Has top groove for long spans in mountainous country.

Tops In Quality

. . . is insured in every Hemingray Insulator. Exacting laboratory control—every batch of glass is checked *hourly* with precision instruments.

That's why Hemingray Insulators are still in service after 20, 30—even 50 years. Hemingray Insulators never fail to give dependable, long-life service.

Insist on Hemingrays for low operating costs.

PROTEK-SORB* desiccant

Mfd. by
The Davison Chemical Corporation

Speed up desiccant-drying with the desiccant that adds effectiveness to the method.

DESICCANT-DRYING ADVANTAGES

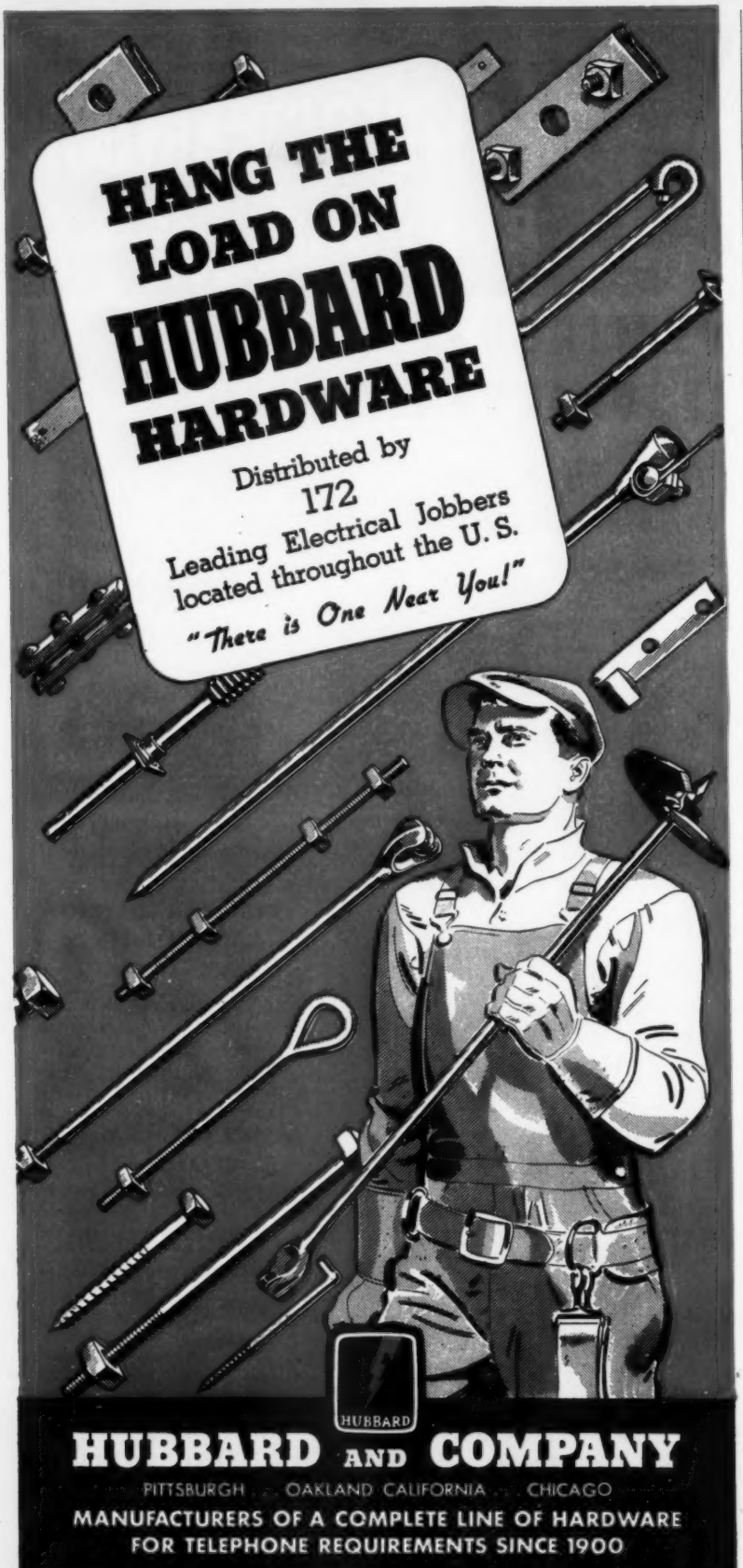
- A simple method
- A faster method
- A safe method
- Less equipment to carry

PROTEK-SORB* desiccant ADVANTAGES

- Dries faster
- Dries more completely
- Restores service quicker
- Safe to use
- Easy to use
- Conveniently packed

*Reg. U. S. Pat. Off.

STROMBERG-CARLSON COMPANY
Factory and General Offices: Rochester 3, New York, U.S.A.
Branch Offices: Chicago, Kansas City, San Francisco, Toronto


HANG THE LOAD ON HUBBARD HARDWARE
Distributed by 172 Leading Electrical Jobbers located throughout the U. S.
"There is One Near You!"
HUBBARD
HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO
MANUFACTURERS OF A COMPLETE LINE OF HARDWARE
FOR TELEPHONE REQUIREMENTS SINCE 1900

Mahogany Pole Line On Guadalcanal

(Continued from page 61)

The ever-marshy condition of the ground on Guadalcanal had necessitated many of the poles being set in holes that filled with water as fast as they were dug. Such poles were held erect by filling the hole around the pole with gravel hauled in from nearby streams. The gravel did a very creditable job of holding the poles upright, but could not withstand the strain from the back-scratching bulls. It, therefore, became routine for the crossarm crew to spend one day of every two in realigning the pole line.

The shortage of through-bolts was overcome by using the ingenuity of a seabee blacksmith shop and converting some ⅝ in. iron rod, which had originally been intended for concrete reinforcement, into through-bolts. Likewise the seabee blacksmith converted a quantity of 2 in. x ⅛ in. strip iron, which was designed to hold in place the marston matting on emergency airfields, into transposition brackets.

By May 1, all poles were in place, all missing hardware had been improvised from available material and work was ready to be started on pulling in the wire. Available personnel, except for the addition of about 10 experienced army personnel, was still confined largely to native labor.

The first day for pulling in the wire was a memorable one. It was decided to use a tractor and pull two circuits, or four wires, at a time. The improvised pay-out reels were to be attended by the brightest natives available, utilizing the remaining natives to dig anchor holes and other miscellaneous tasks that still remained.

The first span of wire crossed the Malimbiu River between two H-fixtures erected on either bank. The wire was pulled across the stream by hand and attached to the tractor on the opposite bank. All went very smoothly until the runningboard was attached to the tractor and the wire began to feed off the pay-out reels at a livelier speed. The natives attending the pay-out reels were unable to concentrate on their job sufficiently to keep the reels from running too fast. Eventually, this resulted in two reels being jerked from the grasp of the attending natives. The resultant snarl of wire was sufficient to suspend

all wire pulling activities for the balance of that day.

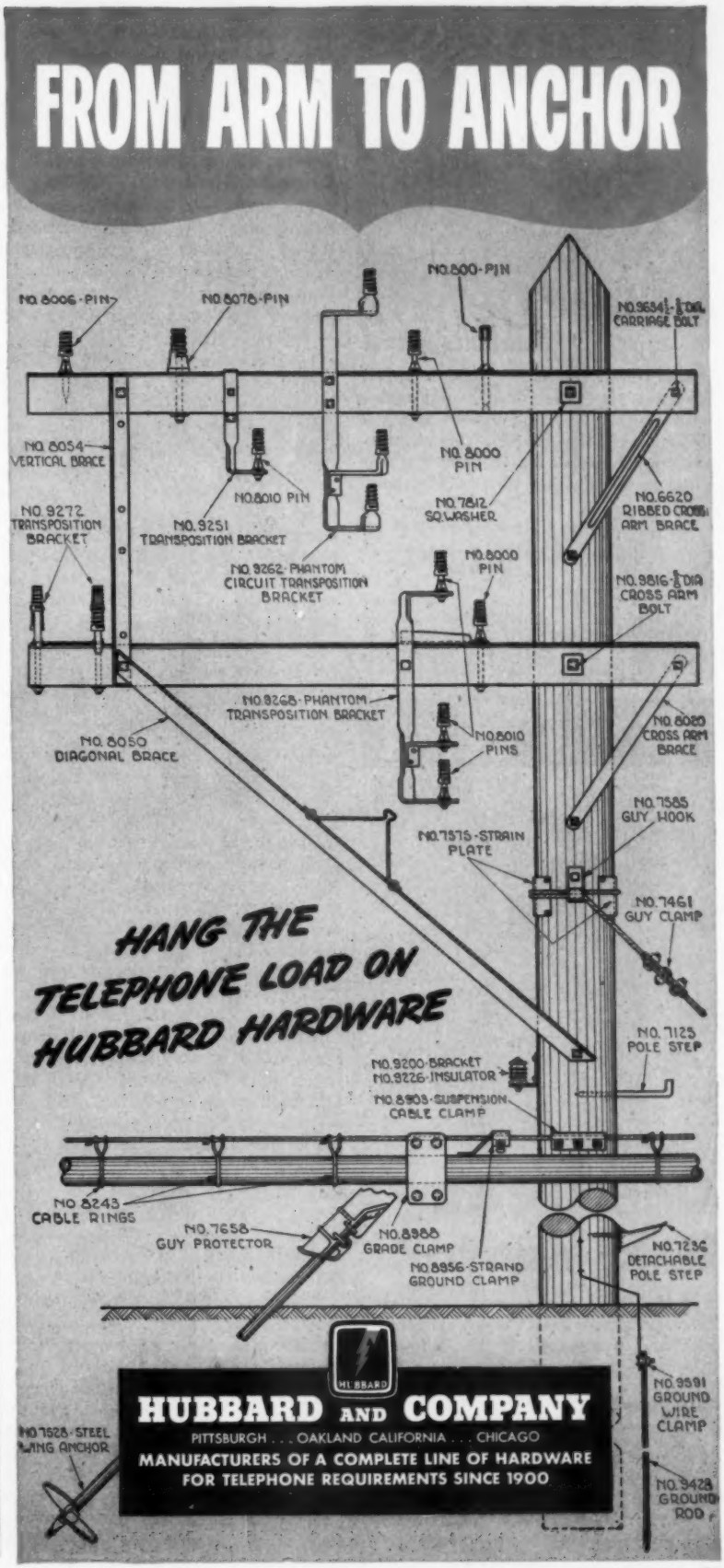
On the following day, a second attempt was made. By much patience, coaching and perseverance, 15 spans of four wires were pulled into place and anchored securely at the 15th span. About half of the 15 spans were sagged and secured to the insulators.

That night it rained. The next morning found the ground in an extremely soggy condition and the rain still falling. Work on the pole line had to be suspended to await the arrival of fair weather. The rain increased in volume during the day and that night, in the mountains, reached cloudburst proportions. By midnight, the Malimbiu River was overflowing its banks and flooding the entire Koli Point area. This flooded condition prevailed for an entire week and, before conditions became such that work on the pole line could be resumed, the flood had wrought havoc to the pole line in the vicinity of the Malimbiu River. The high water in itself had not been too damaging, but the destructive nature of the huge trees and logs that were washed down from the mountains on the crest of the flood had swept away all semblance of a pole line except for the H-fixtures.

New poles were cut to replace the missing ones, and within two days' time everything was in readiness once more to begin pulling in the wire. On the second attempt, all went well, and 15 spans of wire were successfully pulled in. From then on, the job became routine. The natives became more proficient, and only a few cases of runaway pay-out reels were experienced.

On May 27, 1943, the job was completed and by June 1, communications were established between Admiral Halsey's headquarters at Koli Point and the army and aviation headquarters in the vicinity of Henderson Field. It is believed that the construction of this pole line was unique in that the bulk of the labor was performed by natives; the only modern tools available were caterpillar tractors, 1½-ton trucks and the belts and climbers used by the linemen; and the terrain over which the line passed was in itself an almost insurmountable obstacle. In addition, where else in the world was there a pole line that could boast of the distinction of being constructed from white mahogany?

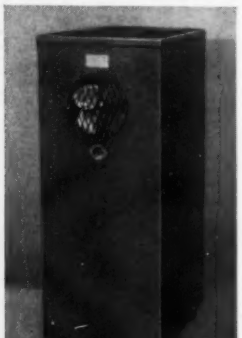
Guadalcanal is no longer a major United States base. However, by last reports, the pole line was still standing and still in use. The chief difficulty that arose after the completion of the line was the continued necessity of replacing poles which had been attacked by termites. Even treated poles did not


FROM ARM TO ANCHOR
NO. 8006-PIN
NO. 8078-PIN
NO. 8000-PIN
NO. 9634 - ⅝ DIA. CARRIAGE BOLT
NO. 8054 VERTICAL BRACE
NO. 8000 PIN
NO. 8010 PIN
NO. 7812 SQ. WASHER
NO. 6620 RIBBED CROSS ARM BRACE
NO. 9272 TRANSPOSITION BRACKET
NO. 9251 TRANSPOSITION BRACKET
NO. 9262-PHANTOM CIRCUIT TRANSPOSITION BRACKET
NO. 8000 PIN
NO. 9816 - ⅝ DIA CROSS ARM BOLT
NO. 9268-PHANTOM TRANSPOSITION BRACKET
NO. 8050 DIAGONAL BRACE
NO. 8010 PINS
NO. 8020 CROSS ARM BRACE
NO. 7585 GUY HOOK
NO. 7575-STRAIN PLATE
NO. 7461 GUY CLAMP
HANG THE TELEPHONE LOAD ON HUBBARD HARDWARE
NO. 7125 POLE STEP
NO. 9200-BRACKET
NO. 9226-INSULATOR
NO. 8903-SUSPENSION CABLE CLAMP
NO. 8243 CABLE RINGS
NO. 7658 GUY PROTECTOR
NO. 8988 GRADE CLAMP
NO. 8956-STRAND GROUND CLAMP
NO. 7236 DETACHABLE POLE STEP
NO. 9591 GROUND WIRE CLAMP
NO. 7628-STEEL GUY ANCHOR
NO. 9428 GROUND ROD
HUBBARD
HUBBARD AND COMPANY
PITTSBURGH . . . OAKLAND CALIFORNIA . . . CHICAGO
MANUFACTURERS OF A COMPLETE LINE OF HARDWARE FOR TELEPHONE REQUIREMENTS SINCE 1900

ALL the strength and durability inherent in steel are combined—with definite economies—in *Crapo* Galvanized Steel Strand. Heavy, ductile, tightly-bonded zinc coatings, applied by the famous *Crapo* Galvanizing Process, provide lasting protection against corrosion.

Ask the distributor of *Crapo* Galvanized Products near you or write direct for further information!

INDIANA STEEL & WIRE CO.
MUNCIE, INDIANA



CHEMICAL Dehydrators

Automatically controlled, using flake calcium chloride, for preventing dampness and condensation in automatic telephone exchanges.

Manufactured and sold by

THE
H. J. KAUFMAN CO.
13215 ROSELAWN AVENUE
DETROIT 4, MICHIGAN

repel the attacks of these insects, and four to six months was found to be the maximum life for most poles.

Broadcasting Station Guides Crippled Bombers

The story just has been released of how a single American broadcasting station, built to wage psychological warfare against the Japs, "doubled in brass" by saving 20 superforts, the lives of 200 flyers and property worth more than $15,000,000.

In November, 1944, James O. Weldon, chief of the Office of War Information, Bureau of Communications Facilities, and five members of his staff embarked for Saipan to undertake the installation of a broadcasting transmitter whose special antenna was capable, in effect, of concentrating the energy of five of the most powerful broadcasting stations of the United States toward Japan. By working day and night, the huge station was ready for the air 31 days later.

The results were immediate. Scarcely had KSAI, the call letters by which the new station is known, begun operations than Jap engineers tried unsuccessfully to jam it. The next evening, radio Tokyo urged its audience, "And now let us all turn off our radios, go to bed early, and conserve our strength through refreshing sleep."

Then came an unexpected pay off. OWI men received an urgent order from the Army, stating, "Keep that transmitter on 24 hours a day permanently from now on!" The explanation quickly followed. A crippled superfort, its navigating equipment smashed, had "homed" on the station with its radio compass and rode the powerful beam to safety. Soon many a crippled bomber crew winged its way home to the crooning of Bing Crosby and Dinah Shore—and requests for "position" from lost fliers dropped from the previous average of 140 a day to a mere 20.

Archaic Japanese Service Is Honorably Explained

The telephone exchange for the Japanese town of Yokosuka, which has 150,000 inhabitants, is a booth in the corner of the post office, writes a United Press correspondent. The telephone is an old wooden affair with a crank, and the receiver hook has a spread that "makes it look as if someone had used it for a bottle opener," through which the receiver keeps dropping. Telephone directories, he states, bear more resemblance to lottery tickets than books.

ELECTRICITY

for STAND-BY SERVICE
CONTINUOUS DUTY
PORTABLE USES

40 KW

More and more telephone companies are installing stand-by electric plants to insure uninterrupted service. We are supplying many of these plants. Already there are well over 1000 "U. S." stand-by units throughout the world at vital radio and communication centers. Write for details.

2 KW to 75 KW

U. S. MOTORS CORP.
556 Nebraska St., Oshkosh, Wis.

ARMY NAVY

ELECTRIC PLANTS

SINCE
1889
NATCO
CLAY CONDUIT
The proved and standard Protection for Underground Telephone Cables.
Cheapest in the long run. Highest quality and a full line of shapes.
National Fireproofing Corp.
202 E. Ohio Street, N. S.
PITTSBURGH, PA.

The Yokohama telephone directory, it is reported, appeared September 3 with the following announcement in English on the cover:

"On the present situation of our telephone service: First, telephone apparatuses are damaged and worn out greatly. Second, maintenance of telephone apparatus could not be made because of lack of hands, especially of expert operators and technicians. Third, in addition to above, owing to damage done by air raids, a larger part of materials for reconstruction was burnt down and consequently it was unavoidable for us to make only provisional repairs, which was a chief cause of frequent troubles of telephone. You are requested to understand above mentioned situation when you use telephone. We are now making utmost efforts, hoping a speedy improvement and reconstruction of our telephone service."

Japs Can't Fool Yank Telephone Men

Natural caution and a healthy respect for Japanese treachery saved the lives of three U. S. Marine telephone trouble shooters, including an Ohioan, on Bougainville. Corp. Bryon J. Griffith, from Lisbon, Ohio, told of what happened when he and two companions were on their way to repair a telephone line to an artillery observation post well ahead of the front lines.

"The lines led smack through the jungle," said Corporal Griffith. "We started moving up the wire trail we'd cut through the brush. It was dark, but just ahead of us was a small clearing. We figured the trouble on the line was a little ahead of us. Suddenly we got a notion that the 'conked-out' wire might be a trap.

"So instead of going to the wire trouble, we pulled the trouble to us. Sure enough the wire had been snipped by the Nips, the insulation torn, and the bare ends twisted together.

"Just then we heard a noise in the tree about 30 yards ahead. We looked in time to see a Jap sniper tumbling to the ground. He got away because we weren't carrying grenades. You couldn't see more than a few yards ahead of you on the ground. The smart Jap had cut the wire and put the ends in a clearing, lining us up for a sweet target when we came to repair it. When we didn't fall for it, he fell out of the tree trying to shift so he could get us. We fooled him."

The mind is like the stomach. It is not how much you put into it that counts, but how much it digests.

...because he used Amertel

This typical American expression of finality describes exactly how telephone men feel when they string Amertel wire. They know that sound engineering and lasting construction calls for the very qualities offered by Amertel galvanized iron or steel wire.

This is true regardless of weather and local conditions for there's an Amertel wire for the longest span or the shortest span . . . for the heavy loading zone and the light loading zone.

And, right now this extra strength and quality that's in every inch of every type of Amertel is more important than ever. It helps do away with repairs, replacements and service calls. The job is done—"once and for all"—when you use Amertel.

Amertel TELEPHONE AND TELEGRAPH WIRE — AMERICAN STEEL & WIRE COMPANY

DISTRIBUTED BY

AUTOMATIC ELECTRIC SALES CORPORATION

1033 WEST VAN BUREN STREET • CHICAGO 7, ILLINOIS

ACORN INSULATED WIRE

DROP WIRE ★ BRIDLE ★ INTERIOR ★ TREE ★ GROUND ★ SWITCHBOARD ★ JUMPER ★ BURIED WIRE ★ FIXTURE ★ INSTRUMENT ★ CABLE TERMINAL ★ POTHEAD ★

Your specifications can be met with a wide variety of materials in the form of conductors (solid or stranded: copper, bronze, copper-weld, iron, aluminum, etc.), insulation (rubber, plastic, synthetics, etc.), and braids (cotton, glass, silk, etc., with a variety of braid treatments).

ACORN INSULATED WIRE CO., INC., 225 KING STREET, BROOKLYN 31, N. Y.

LEICH SALES CORP., 427 W. Randolph St., Chicago

LINDSAY SUPPLY CO., 4815 Superior Ave., Cleveland